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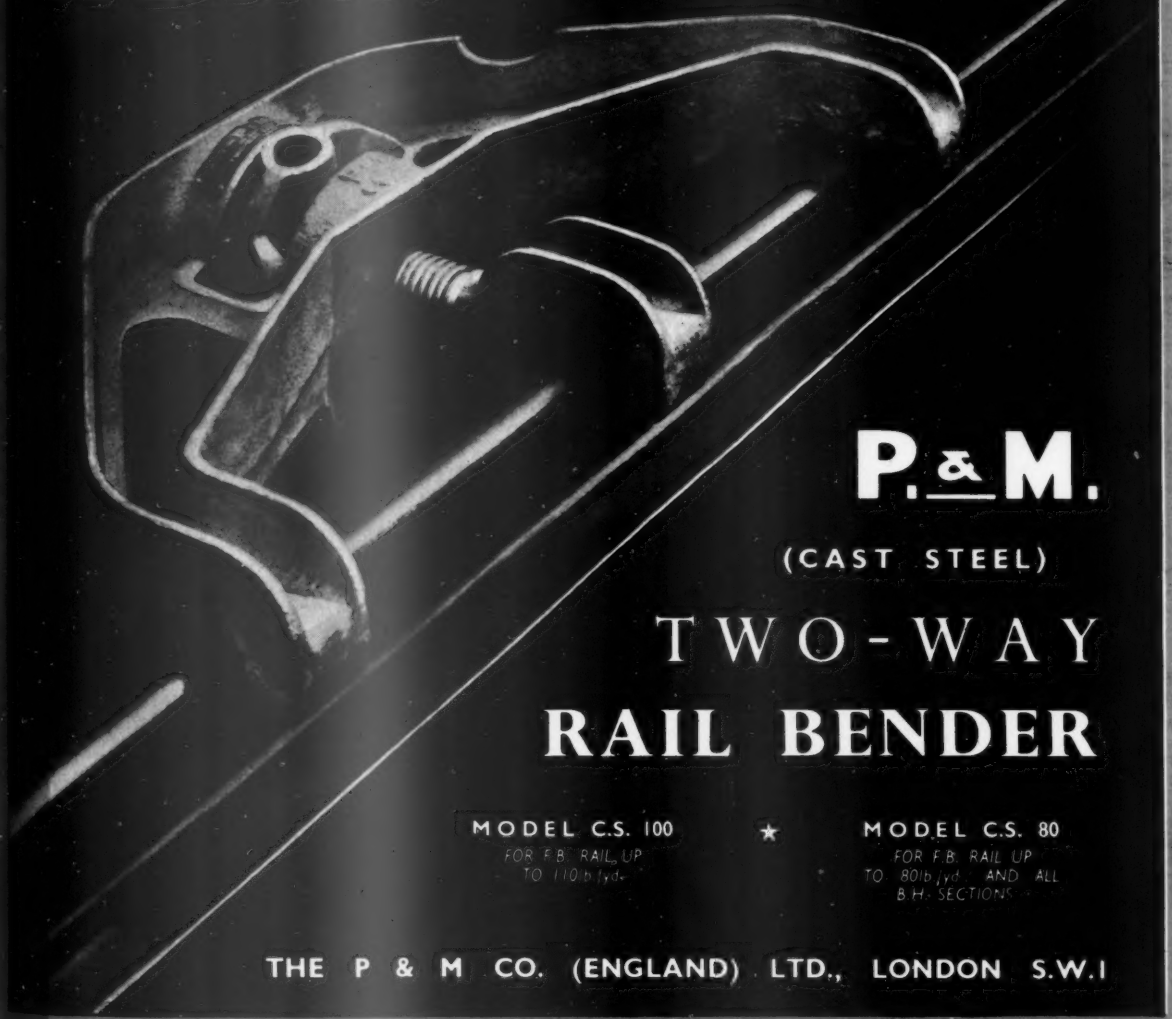

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BRISTOL: 8, Upper Berkeley Place, Clifton . . . . Bristol 21930
Annually £5 by post. Single copies, Two shillings.
Registered at the G.P.O. as a newspaper. Entered as second-class matter in U.S.A.
Editor: B. W. C. Cooke, Assoc. Inst. T.

Vol. 109] FRIDAY, AUGUST 29, 1958 [No. 9

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Railway Pay Inquiry

LAST May, when wage negotiations between the British Transport Commission and the three railway unions were brought to a satisfactory conclusion, Sir Brian Robertson, Chairman of the Commission, undertook to effect a review of the railway wages and salaries structure at an appropriate time in the future. The award of the Railway Staff National Tribunal, made at an early stage of the proceedings, had stated that "the evidence before us shows that the basic rates of staff covered by the present claims are low in comparison with those cited to us as applying in other nationalised industries, public services and certain private undertakings." In other words, the minimum rates of some grades of railway workers compares unfavourably with those earned by employees in similar occupations outside the service. The first step now has been taken toward implementation of the Commission's undertaking. On August 25, Sir John Benstead, Deputy Chairman, accompanied by Mr. J. W. Watkins, Member, Mr. A. R. Dunbar, Manpower Adviser, and other representatives of the Commission, met representatives of the three railway unions for a preliminary discussion on the inquiry. There was general agreement that this should be conducted independently, and a sub-committee was formed from both sides to agree detailed arrangements. The first meeting will take place on September 9. This is the first review of its type on the B.T.C. to be carried out by an outside agent. The N.U.R. may favour an independent view because it believes it will pay greater attention to actual wage levels than to wage differentials within the industry, while the skilled A.S.L.E.F. may hold the contrary opinion that it will effect increased differentials. It is probably over-optimistic to expect that all measures advocated to effect a more equitable distribution of reward will meet with general union approval. The Commission doubtless has agreed to an independent judgment because it feels that there should be no question as to the impartiality of the findings. This may be a mistaken assumption. Trade union reaction to the latest comments of the Cohen Council, a body patently free from bias and one completely unconnected, save by appointment, with the Government, seems to show that an impartial judgment weighs less with the unions than one in line with their own opinions.

New B.T.C. Amalgamation

THE amalgamation announced this week of the Mechanical and Carriage & Wagon Departments of the British Transport Commission into a unity under one officer of British Railways Central Staff is a logical development of current Commission policy. In the interests of greater efficiency, the B.T.C. is showing an increasing and welcome tendency to bring its managerial and technical staffs more closely together. Sufficient in itself to justify its practice, this course is additionally prompted by the growing acquisition by the B.T.C. of diesel and electrical multiple units, the best use of which obviously will result from a single direction. Mr. J. F. Harrison, now Chief Mechanical & Electrical Engineer of the London Midland Region of British Railways, has been appointed to the new position of Chief Mechanical Engineer, British Railways Central Staff. Mr. Harrison, whose illustrated biography was published in our August 15 issue, recently assumed overall responsibility for mechanical and electrical engineering work on the London Midland Region. With over 35 years of experience of motive power engineering, he is particularly well qualified to undertake his important new responsibilities and to ensure that his new department develops according to the Commission's plans.

Expansion in Brazil

NEW construction in Brazil is making rapid progress, though whether it is keeping pace with the expanding economy of the country is problematical. Some 267 route-miles were opened last year in different parts of the Federation, including the Amapa Railway, 120 miles. Over 100 miles have been brought into use since January; the longest section inaugurated is 55 miles of the Nordeste, from Joazeirinho to Patos. One of the three Nordeste main lines is being extended from Flores to Salgueiro, whence it will be extended to Petrolina. The Ceara Railway, recently connected with the Nordeste at Patos, will shortly be linked with the Leste Brasileira by a ferry service over the Sao Francisco River, between Colegio and Propria; the ferry is eventually to be replaced by a reinforced concrete bridge, 1,500 yd. long. On the Central Railway, electrification is planned of the Japeri-Conrado section of the Linha Auxiliar in the Rio suburban area. Recent deliveries of material from abroad include rails for the large-scale track renewals now in hand. But it seems that demands for all kinds of equipment will continue to be very great for a long time to come.

Costing in Rate Quotation

ONE of the advantages claimed for the decentralisation in rate quotation made possible by the traffic organisations recently brought into being or still being formed in five Regions of British Railways, is speed in quoting;

traffic managers have greater autonomy, and in most cases need not refer higher before fixing a rate. Promptness has obvious advantages, more especially in view of competition from road hauliers and the possibilities of "C"-licence transport. On the other hand, there is a temptation to bid for traffic with a rate which does not cover costs, which may be relatively high where marshalling is involved, despite efforts to rationalise working. This is where the costings organisation of British Railways is playing an increasingly important part. In at least one Region there are costings officers at traffic managements, who can provide information for accurate assessment. Consultation with the receiving district is obviously necessary in some cases. That is not to deny the value of the time-honoured, but rule-of-thumb, methods used hitherto, which consists largely of quoting rates known by experience to be profitable.

Rhone Valley Electrification Extended

CONVERSION at 1,500 V. d.c. of a further section of the French National Railways Paris-Marseilles main line, that from Lyons to Valence, 65 miles, is due for completion by the middle of next month. With the introduction of the winter timetable on September 28, all main-line trains between Paris and Marseilles, the Riviera, and Languedoc will be electrically hauled over the 383 miles from the capital to Valence. Prolongation of the 1,500-V. system fo Tarascon, and over the short link between Tarascon and Nîmes, to connect with the d.c. electrification in the Midi, should not take long, nor the last 60-odd miles to Marseilles. These extensions of the d.c. electrification are relatively simple compared with those of the 50-cycle system in progress in the North and East; though some heavy civil engineering work is involved, notably in increasing clearances through tunnels and under bridges in the Rhone valley. The French are reconciled to two electrification systems, and the technical problem of junctions between them is now solved.

Overseas Railway Traffics

OPERATING revenues of the Canadian National Railway for June, 1958, amounted to $59,785,000. Expenses, taxes, and rents totalled $61,757,000, resulting in a net operating income deficiency for the month of $1,972,000. In June, 1957, operating revenues were $61,513,000; expenses, taxes, and rents were $62,685,000 and the net operating income deficiency was $1,172,000. The aggregate net operating income to June 30 showed a deficiency of $20,299,000 compared with a profit of $9,623,000 in the corresponding period of 1957. Canadian Pacific Railway revenues for June, 1958, were $40,817,858 (against $44,343,037 for June, 1957) and railway expenses $37,099,203 ($39,409,143). Aggregate net earnings from January 1 were $16,016,147 ($15,145,080). Railway operating revenues of the International Railways of Central America for June amounted to $1,112,652.

London Peripheral Services

THE prospects of any peripheral railway service in the London area justifying its existence are generally thought to be remote. Even lines which might not be regarded as peripheral in most respects, such as the Hammersmith to Edgware Road section of the Metropolitan Line of London Transport, which runs, though not directly, to and from the West End and City, are regarded as poor revenue earners. This is mainly because the demand for transport, except perhaps at peak hours, does not justify units as large and as expensive to operate as trains. A good many such services have disappeared in recent years. They include the Willesden Junction to Earls Court electric trains of the former L.M.S.R., the L.T.E. Metropolitan Line service between Edgware Road and Kensington Addison Road (now Olympia) via Latimer Road, and the West London Extension line trains between Olympia and Clapham Junction. The future of others, such as the Seven Sisters to Palace Gates branch of the Eastern Region, is not bright. Others again seem likely to continue. Among them is the Southern Region Wimbledon to West Croydon electric service—which runs over some of the few miles of electrified single line in Britain; it apparently meets a local transport need, for there is no good road service parallel to it.

Western Region Diesel Railcars in Middlesex

HOW far the Ealing Broadway to Greenford service of the Western Region can be deemed peripheral is doubtful. Like several services in the London suburban area, it conveys passengers to and from a larger centre—Ealing in this case—for which it acts as a minor suburban service. In considering passenger traffic in and around London it is easy to forget that many people have occasion to travel to and from local centres—let alone factories—quite apart from the traffic to and from the City and West End. The Ealing-Greenford line is an example of the use of diesels to cut operating csots. Since last Monday the Western Region has been working this short section with two-car units built by the Gloucester Railway Carriage & Wagon Co. Ltd. Their introduction and consequent economy in working has made possible restoration of the trains withdrawn as an economy measure on June 30. In addition, they afford more accommodation and considerably more comfort than did the steam-hauled trains which they have replaced.

The Nasmyth Exhibition at Eccles

JAMES HALL NASMYTH achieved eminence in diverse activities as inventor, astronomer, and artist. To mark the 150th anniversary of his birth at Edinburgh on August 19, 1808, an exhibition is being opened tomorrow (Saturday) at Eccles Town Hall by Mr. Robert Arbuthnott, a former Director of Nasmyth, Wilson & Co. Ltd., the successor to the Bridgewater Foundry which Nasmyth founded in 1836, and President of the Institution of Locomotive Engineers. The exhibition includes original items loaned by Mr. Arbuthnott himself, by the Institution of Mechanical Engineers, the Locomotive & Allied Manufacturers' Association, and others; the exhibition closes on October 4. Nasmyth witnessed the opening of the Liverpool & Manchester Railway on September 15, 1830, and sited his foundry because of its proximity to rail and canal transport. Within two or three years the Bridgewater Foundry was prominent in development of the steam locomotive, and continued so, with a brief intermission, for a century. A record of its early days was published in *The Railway Gazette* of June 27, 1913. The steam hammer, with which the name Nasmyth is associated, was invented in 1839 as a direct consequence of his early business connection with the Great Western Railway. He retired from the business in 1856, but lived until May 7, 1890.

London-Sheffield Expresses

BEFORE grouping in 1923, many attempts were made by competing railways to stimulate traffic between Sheffield and London by very fast timings, especially after the Great Central Railway had made its way into London in 1899. By 1905 that company was scheduling a time of 2 hr. 50 min. over its 164¾-mile route from Marylebone; this stirred the Great Northern to introduce a similar time non-stop over the 161¼ miles from Kings Cross, though both times were soon eased out. In 1924 a Pullman service was tried by the L.N.E.R. between Kings Cross and Sheffield, calling en route at Nottingham and thence travelling by the G.C. line; but starting times at 11.5 a.m. from London and 4.45 p.m. from Sheffield did not attract. So in the spring of 1925 the Retford route was tried instead, and the Pullman train was extended to Manchester; with this working the start from Sheffield was at 11·3 a.m. and from Kings Cross at 6.5 p.m., but again the facility attracted little patronage, and from September, 1925, the Pullman train was transferred to the Leeds service, to become the nucleus of what is now the "Yorkshire Pullman." Sheffield came under notice once again in the Midland accelerations effected by the L.M.S.R. in 1937, when the "Yorkshire-

man" was accelerated to a non-stop run from St. Pancras to Sheffield in 2 hr. 52 min. Again, however, patronage was insufficient, and by 1939 an intermedate stop had been introduced and the time lengthened to 3 hr. 5 min.

The Pullman "Master Cutler"

NOW, after nearly 20 years since the best London-Sheffield times immediately before the last war—2 hr. 56 min. by the Midland route and 3 hr. 6 min. by the Great Central—Sheffield is once again to have a Pullman train service, this time with diesel haulage and on the fastest schedule ever attempted between Sheffield and London. Leaving Sheffield Victoria at 7.20 a.m., the new train, calling only at Retford, will be due in Kings Cross at 10.5 a.m.; the return journey will begin at 7.20 p.m., and Sheffield will be reached at 10.5 p.m. It is hoped by the Great Northern Line to reduce this time of 2¾ hr. for the 161½ miles even further when all the engineering work on the main line in connection with electrification has been completed. Besides the morning and evening runs, the Pullman train is to make midday journeys, from Kings Cross at 11.20 a.m. and Sheffield at 3.20 p.m., calling intermediately at Peterborough, Grantham and Retford in each direction, in 2 hr. 55 min., so that the set of cars will achieve a daily mileage of 646, all at high speed. The up morning and down evening workings are to take over from the existing 7.50 a.m. from Sheffield to Marylebone and the 6.18 p.m. from Marylebone to Sheffield the distinctive title of "Master Cutler," and rightly, as the up timing of the new train will be 52 min. faster and the down 57 min. faster than of the present "Master Cutler" over the G.C.R. route.

Automation in Marshalling Yards

THE recently-opened marshalling yard of the Chicago, Burlington & Quincy Railroad at Cicero, Illinois, near Chicago, has advanced features of automatic retarder control. As wagons approach the single primary retarder they are weighed and the degree of retardation is adjusted accordingly. The braking pressure can also be adjusted, by a dial control, to give higher retarder-leaving speeds in cold weather and slower speeds in warm, wet weather. The wagon then approaches one of six "group" retarders leading to the 43 classification tracks. These secondary retarders are controlled by an electronic computer fed with information on the "rollability" of the wagons, the length of the cut, the characteristics of the route to the selected track, and the length of empty track remaining. "Rollability" is found by radar measurement of acceleration on a known gradient between the primary and secondary retarders, adjustment being made automatically for the length of cut. A factor is added to allow for the effect of points and curves between the retarder and track concerned. The length of empty track is found by counting, by treadle and impulse counter, the number of axles entering any given track. A factor can be fed to the computer to allow for wind strength and direction.

Leaving Against the Signal

THE collision between a passenger and freight train at Hooton South Junction, on the Chester-Birkenhead line, on January 22, 1958, was inquired into by Colonel D. McMullen. He found the cause, as shown in our summary of his report in this issue, to be failure to observe the adverse starting signal at Ledsham station and to keep a sufficiently good lookout thereafter. This was all the more necessary because of the uncertain weather. Had the guard exercised more care he might have detected the driver's initial blunder and taken appropriate action. Fortunately the consequences for the persons in the overtaking train were not grave. The evidence given was in some respects not particularly satisfactory, but in the end there was little doubt regarding the essentials of the case which began with an important signal, which the driver admitted he had expected to find at danger, being completely overlooked.

Great Eastern Line Winter Services

BETTER service to the passenger, and reduction in motive power and rolling stock user and man-hours worked, with a view to effecting economies, are characteristics of the main-line timetable reorganisation of the Great Eastern Line of British Railways, Eastern Region, the third of its kind since the "Britannia" Pacifics were introduced in 1951—which is to take effect from September 15. The main feature is the allocation to the line of enough 2,000-h.p. English Electric and 1,250-h.p. Brush diesel-electric units to make possible further substantial accelerations and also release sufficient "Britannias" to take over the Liverpool Street-Clacton service almost in its entirety, besides other duties. All the latter trains therefore are being put on the timings between London and Colchester hitherto worked to only by Norwich trains with Class "7" steam power.

The most striking development is that there will be six expresses daily covering the 115 miles between Norwich and London in 2 hr. With the up "East Anglian" at 11.45 a.m., the 2.45 p.m., and the "Norfolkman" at 5.45 p.m., the time allowed will be 45 min. for the 46·3 miles to Ipswich, and 73 min. for the 68·7 miles thence to London. In the down direction the 9.30 a.m. "Norfolkman," 3.30 p.m. "Broadsman" and 6.30 p.m. "East Anglian" will be the corresponding workings, with 73 min. to Ipswich and 44 min. for the 46·3 miles on to Norwich.

Hitherto the 3.30 p.m. down "Broadsman" has been the only train on a 2-hr. schedule; all the others have been allowed 2 hr. 10 min. Moreover, the maximum load for "Britannia" Pacifics on these workings has been nine coaches, with the result that the "East Anglian" on Fridays, with 11 on, has been allowed 2 hr. 20 min.; but the 2,000-h.p. diesels will take up to 11 vehicles on the 2-hr. schedule, so that there will be no increase in any train times on Fridays. All the other expresses on the Norwich service, which run at hourly intervals, are being speeded up, seven of them by 11-19 min., and the principal towns in East Anglia will have an enviably fast and frequent service as the result.

The same applies, as already mentioned, to the service between Liverpool Street, Clacton, and Walton-on-the Naze. The morning and evening business trains were accelerated in June last with the introduction of the "Essex Coast Express," and the same standard of speed is now being applied to the midday trains. These in future will leave Liverpool Street at 9.45 and 11.45 a.m. and 3.45 p.m., with times of 104, 108, and 108 min. to Clacton, which represent accelerations of 35, 11, and 11 min. on the times of last winter; in the up direction departures from Clacton will be at 10 a.m., 1.0, 4.7 and 6.20 p.m., timed to Liverpool Street in 105, 102, 110, and 100 min., which means respective gains of 13, 16, 17, and 11 min.

Another important reorganisation is over the Cambridge main line. Because of engineering work in the London suburban area in connection with electrification it is necessary slightly to ease most of the times between Liverpool Street and Cambridge, but between there and King's Lynn and Hunstanton substantial accelerations have been planned as the result of the abandonment of through coach working (except the early morning 4.20 and 5.54 a.m. down trains and the 10.24 p.m. mail) between London and Norwich via Cambridge. The main reason for the abandonment of through coaches between London and Norwich *via* Cambridge is saving in stock workings; but, as will be seen, there are compensating advantages, especially with introduction of more diesels.

Passengers to and from stations between Ely and Norwich will therefore require to change at Ely; the workings between Ely and Norwich will be taken up by diesel multiple-units from the Norwich pool. The station working at Ely will be so arranged that passengers changing there will not have to use the subway; and an acceleration in point-to-point times between Ely and Norwich will mean that there will be little change in overall journey times. As a result of curtailed stops at

Ely and acceleration north of Cambridge, the 8.24 a.m. from Liverpool Street will be accelerated 26 min. to Hunstanton and the 5.54 p.m. 24 min.; in the up direction the 9.6 a.m. and 3.38 p.m. from King's Lynn will be faster to London by 24 and 23 min. respectively; and other trains will be speeded up similarly. In general, these trains will be nine-coach formations, of which four with the buffet car will be detached at Ely going down and attached coming up, an arrangement which will have the merit of marshalling the buffet car in the centre of each train. By and large, passengers benefit, though the changes at Ely may be irksome to a few.

As to other improvements, the North Country Continental train from Liverpool, Manchester, and Sheffield is to be accelerated so as to give a greater margin at Parkeston Quay before the arrival of the "Hook Continental" from Liverpool Street. The 11.30 p.m. from Liverpool Street to Bishops Stortford, the one service over this line provided by a diesel multiple-unit set, is to reach Bishops Stortford at 12.27 a.m., 11 min. earlier. On the Southend electric service, to relieve overcrowding, new trains are being put on at 8.22 a.m. from Southend Victoria to Liverpool Street, calling at stations to Billericay and thence fast, and the return working at 5.56 p.m., introduced experimentally in May, will be continued. Throughout the day, also, the hourly 60-min. trains, at present non-stop between Hockley and Southend, will stop alternately at Rochford and Prittlewell, to improve the service at those stations without increase of overall journey time.

Among minor alterations, faster and additional trains are being provided between Witham and both Maldon and Braintree, made possible by more intensive use of the diesel railbuses recently introduced. First class accommodation will be restored on some of the diesel multiple-unit workings between Ipswich, Saxmundham, and Aldeburgh and between Colchester and Brightlingsea. As more diesel multiple-units are delivered from the manufacturers, further substantial improvements in local and branch services have been planned, and will be brought into operation progressively through the winter.

Track Renewal in Victoria

FOR the past 20 years replacement of Victorian Railways worn-out track has been hampered by shortages of men, materials or money. Many speed restrictions are necessary for safety. A programme of track re-laying to stop deterioration now is being carried out with mechanised equipment. Last year the Commissioners reported to the Government that at least 104 miles a year must be re-laid: 24 miles of suburban, 50 of main country, and 30 miles of branch line. They also pointed out that the lack of adequate maintenance seriously impeded any comprehensive programme for improving goods and passenger services to meet growing competition. Last year 82 miles of track were re-laid and 190 sets of points and 300 crossings renewed. This year it is hoped to re-condition 114 miles of track.

Much new equipment is being used. Two gangs, one of 90 men the other of 75, have been specially trained for track maintenance work. At the beginning of the year the larger gang was working on the North-Western line, replacing existing 80-lb. rails with new 94-lb. rails in 90-ft. lengths at the rate of just over a mile a week. The 80-lb. rails were cropped at the Spotswood Permanent Way Depot near Melbourne, to remove the battered ends. The sound middles were then welded into 90-ft. lengths and laid by the second mechanised gang in replacement of 75-lb. rails on the Goulburn Valley line at the rate of about 50 ch. a week.

At present work is proceeding on the main Adelaide line and part of the Goulburn Valley line. Re-laying of the Adelaide line, extending 280 miles from Sunshine, the end of the suburban area, to Serviceton, near the South Australian border, is expected to take three years. Work on the Goulburn Valley line should be finished by the end of this year. The gang will then start work on the track between Geelong and Porty Fairy, 141 miles, which comprises the main South-Western line. Restoration of narrow cuttings and improvements to drainage is carried out by Gradall excavators, of which the Victorian Railways own three.

Difficulty is reported from Victoria in obtaining first class hardwood sleepers. Most sleepers being used today are expected to have only half the life of those formerly available. The Commonwealth Institute for Scientific & Industrial Research has developed a method of doubling the life of sleepers to 20-25 years by impregnation with preservatives under high pressure. It was intended to establish a preservative plant for sleepers at Dandenong at a cost of £300,000; but the plan has had to be shelved because of financial difficulties.

Italian Development Plans

LIKE most industrially developed, and developing, countries, whatever the financial situation of the railways, Italy finds it imperative to improve the railway system in nearly all parts of the country. Two notable features of the plans are the extent of financial aid from Switzerland and the large amount of electrification, with the help of power produced from natural steam from underground. On a recent inspection tour in Tuscany, Signor Ing. Severo Rissone, General Manager of the Italian State Railways, outlined the development plan on which this system has embarked, and emphasised that many of the schemes now in hand would be completed before the end of 1961.

Financial considerations, he added, had been a handicap. Out of the required funds for the scheme, which amounted to 250,000 million lire (£141 million) the State Railways would receive one-half only; in addition, they could count on certain contributions in connection with particular schemes, such as 15,000 million lire from the Cassa del Mezzogiorno (the special Board for Southern Italy) for improvements to certain lines in the South; or the loan of 200 million Swiss francs granted by the Swiss Federal Railways as a contribution towards the electrification of certain lines in northern Italy to improve the connection between Genoa and Switzerland. Another 15,000 million lire has been earmarked by the Cassa del Mezzogiorno for the building, now in hand, of two ferryboats to be placed in service between Civitavecchia and Olbia, at the northern tip of Sardinia; also for new refrigerator wagons.

The electrification of the lines covered by the Swiss loan is in hand and is to be completed by 1959. The lines concerned are: Alessandria-Novara (41 miles) Novara-Arona (23); Gallarate-Luino (29); and Luino-Bellinzona (25 miles), of which only nine miles are in Italy, with the rest in Switzerland. Besides these conversions electric traction is to be introduced on the following lines on certain of which work is already in hand: Voghera-Piacenza (36 miles); Bergamo-Carnate-Usmate (16); Mestre-Udine (79); Mestre-Cervignano (64); Ravenna-Castelbolognese (26); Ancona-Pescara (92); Pescara-Sulmona (41); Terontola-Foligno (52) Pistoia-Montecatini-Lucca (27); Lucca-Pisa (15); Lucca-Viareggio (14) and Catania to Syracuse (55 miles). Electrification from Mestre to Cervignano will afford electric traction over the "Simplon-Orient Express" route between Paris and Jugoslavia. One hundred electric locomotives are to be ordered in addition to a certain number of electric railcars for local services. For other electrified lines, 100 diesel-electric locomotives have been ordered; the first 25, to be delivered within the coming months, are to be allotted to lines in southern Italy, particularly to the Reggio Calabria-Bari coastal line. All these, it is understood, are to be constructed by Italian builders. The plan also provides for building of 375 passenger coaches; of a third multiple-unit electric express set of the type already operating between Rome and Milan; and of 4,000 wagons of various types.

Additional supplies of electric power to cover the railways' increased requirements are to be derived from the

Morbegno hydro-electric plant near Sondrio, in the Alps, to the north-east of Milan, where large-scale extensions are in hand. These extensions are designed to increase the annual capacity of Morbegno by 350,000,000 kWh. Some of the additional power will be produced by two new power stations to the south-west of Florence. These two power stations, belonging to the group of power plants in the Lardarello region, are to operate on natural steam expelled under high pressure from underground. At present the Lardarello power stations produce some three-quarters of the power needed by the Italian State Railways—an invaluable aid to electrical operation, besides reducing the cost of generating power.

Doubling and associated works are making good progress on the Battipaglia to Reggio Calabria main line, the principal artery connecting the mainland with Sicily. The project was described in our issue of October 5, 1956. Re-laying of 870 route-miles of main line with 119-lb. rails is envisaged, and a further 370 route-miles of secondary line are to be re-laid with lighter rails.

British Transport Commission Traffic Receipts

THE mineral traffic receipts of British railways have long been regarded as indicators of industrial activity. It is disconcerting, therefore, that British Railways mineral traffics for Period 8, the four weeks ended August 10, were only £2,539,000, compared with £3,356,000 for the corresponding period of 1957. The four weeks under review included the August bank holiday weekend, and there is a slackening of activity in many industrial concerns in late July and early August, so that it is not surprising that the figure for Period 8 is considerably less than the £3,240,000 for the preceding four weeks—though here again there was a decline as against last year's total (£3,897,000). In view of the drop in steel production, poor mineral traffics were to be expected, but £2·5 million is very low, even after allowing for seasonal factors. Nor are coal class traffic receipts at £6,368,000 encouraging, compared with the corresponding figure for 1957 of £7,147,000.

—	Four weeks to August 10, 1958		Incr. or decr.	Aggregate for 32 weeks		Incr. or decr.
	1958	1957		1958	1957	
	£000	£000	£000	£000	£000	£000
Passengers—						
British Railways ..	16,331	16,869	− 538	86,667	89,365	− 2,698
London Transport:						
Railways	1,763	1,711	+ 52	15,114	14,283	+ 831
Road services ..	4,216	4,513	− 297	27,353	36,814	− 9,461
Provincial & Scottish buses	5,813	3,758	+ 2,055	36,703	35,399	+ 1,304
Ships	1,345	1,352	− 7	4,262	4,256	+ 6
Total Passengers ..	29,468	28,203	+ 1,255	170,099	180,117	− 10,018
Freight, Parcels & Mails—						
British Railways:						
Merchandise & livestock	5,855	6,675	− 820	57,462	66,616	− 9,154
Minerals	2,539	3,356	− 817	28,341	32,290	− 3,949
Coal & coke ..	6,368	7,147	− 779	77,104	76,581	+ 523
Parcels, etc., by passenger train ..	3,885	3,782	+ 103	31,532	30,666	+ 866
Collection & delivery, etc. ..	893	922	− 29	7,625	8,247	− 622
Total freight British Railways	19,540	21,882	− 2,342	202,064	214,400	− 12,336
Others—*	3,862	3,943	− 81	33,307	33,560	− 253
Total Freight, Parcels & Mails	23,402	25,825	− 2,423	235,371	247,960	− 12,589
Total	52,870	54,028	− 1,158	405,470	428,077	− 22,607

* Inland waterways, freight, road haulage, and ships

British Railways merchandise and livestock receipts for Period 8 were only £5,855,000, against £6,675,000 last year. That they reflect a decline in despatches, and indeed in commercial and industrial activity in general, is shown in the receipts, during these four weeks, from the other nationalised freight-carrying activities (inland waterways, British Road Services, and ships), which were £3,862,000, against £3,943,000 in 1957. The picture is a melancholy one. Aggregate freight, parcels, and mails receipts of the British Transport Commission for the first 32 weeks of the current year were £235,371,000, against £247,960,000 last year.

Nor is the passenger traffic situation much more encouraging. For the four weeks embracing the peak holiday traffic of the year British Railways passenger receipts were £16,331,000, compared with £16,869,000 for Period 8 of 1957. The weather last year also was poor, so affecting excursion traffic. Ships' passenger receipts were £1,345,000 (£1,352,000 last year), but the published figures do not show the division as between Continental, Irish and other marine services. The expected drop in London Transport road traffic receipts resulting from the bus strike, is evident. Comparison between this year and last of receipts from the Commission's provincial and Scottish bus undertakings is affected by the bus strike of July 20-28, 1957.

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS PERCENTAGE VARIATION 1958 COMPARED WITH 1957

	Four weeks to August 10	32 weeks to August 10
British Railways—		
Passengers	− 3·1	− 3·0
Parcels	+ 2·7	+ 2·8
Merchandise and livestock	−12·2	−13·7
Minerals	−24·3	−12·2
Coal and coke	−10·8	+ 0·6
C. & D. services	− 3·1	− 7·5
Total	− 7·4	− 4·6
Ships (passengers)	− 0·5	+ 0·1
British Road Services, Inland Waterways & Ships (cargo)	− 2·0	− 0·7
Road Passenger Transport, Provincial & Scottish ..	+54·0	+ 3·6
London Transport—		
Railways	+ 3·0	+ 5·8
Road services	− 6·5	−25·6
Total	− 3·9	−16·8
Aggregate	− 2·1	− 5·2

Passageways for Passengers

CIVIL engineers will find useful the results of operational research by London Transport on passenger flows in subways. The subject is of special interest in relation to new stations on main-line and underground railways, and, as traffic increases, to substitution of subways for surface crossings between platforms in stations and for pedestrian level crossings on open track. The results were presented in a paper to the recent Open Conference at Harrogate of the Operational Research Society by Mr. B. D. Hankin and Mr. R. A. Wright, both of the staff of Mr. A. T. Wilford, Director of Research, London Transport. The investigation was undertaken at the request of Mr. C. E. Dunton, Chief Civil Engineer, L.T.E., who wished to improve on the rough-and-ready, though reasonably satisfactory, methods used for measuring subway capacity: "To study the flow of passengers in subways, including the effect of constructions such as stairs and corners in order to assist in the design of new facilities." The last-mentioned refer to the projected Victoria Line. A preliminary study of work carried out elsewhere suggested that no satisfactory theory explaining the mechanism of pedestrian traffic flow could be found.

Observers first visited many subways and stairways and timed passengers passing a point, so as to calculate the flow. It was found that there were considerable variations in results for a given place because of the difficulty of deciding when the maximum flow at that point was taking place. Also, flow is affected by events beyond both ends of the section observed, which can result in false measurements. These difficulties were minimised by taking many measurements when a subway seemed to be fully loaded, and by using only the highest three readings to obtain an average maximum flow for a given site. As passages became crowded, there seemed to be a gradual slowing down in speed, so that the flow past a point was not

necessarily increased by having a crowded subway. It was therefore desirable that the relationship between speed and concentration of passengers in conditions which would obviate interference from extraneous effects should be investigated. The expense of hiring film extras or of using enough L.T.E. staff for the experiments would have been prohibitive, but the co-operation of a boys' school was obtained and a controlled experiment carried out. Two concentric rings of chestnut paling were held up by boys standing on an asphalt surface to form a circular passageway initially 4 ft. 3 in. wide and 30 ft. internal dia. Boys were fed into this passageway gradually, starting with a few walking round and ending with a dense crowd of more than 200 boys. Speed measurements were made at concentrations for several passage widths and the shape of the speed concentration curve was established. The flow-concentration curve followed from it.

It was realised that the behaviour of boys in these artificial circumstances would not be the same as that of passengers in actual transit, but the object of the experiment was to establish the shapes of the curves relating the variables rather than to obtain absolute values. Once the curves could be established it would be easier to understand what was happening in the London subways.

A simple and flexible method of measuring the relationship between speed and concentration was evolved for use in subways. Two observers with stop-watches stationed themselves in a subway at a measured distance apart. At a given signal both started their stop-watches and the up-stream observer joined the stream of passengers, walking with them at their own speed until he reached the other observer, when he stopped his watch. The down-stream observer counted all the passengers passing him between the time of starting his stop-watch and the other observer reaching him. In this way the total number of passengers originally in a measured area between the two observers was obtained (hence the concentration) and also the time of the movement (hence the speed). By carrying out these measurments in a number of subways at different concentrations the general shape of the curves obtained with the boys was confirmed and absolute values suitable to passengers in London were obtained.

Among the more important conclusions are the following:—(1) Above a minimum width of about 4 ft., the maximum flow in subways and on stairs is directly proportional to width. If the subway is narrower than this, multiples of shoulder widths became important. In certain circumstances, a centre handrail dividing a passageway can reduce its capacity as a whole. (2) Stairways, on which movement is markedly slower than in subways, are likely to form bottlenecks. (3) When a subway becomes more crowded there is an unconscious slowing down caused by the wish to avoid treading on the heels of the person in front. This results in the flow reaching a maximum beyond which increased crowding is accompanied by slowing down. (4) Free passenger flow speed in empty passageways was found to be 3·6 m.p.h., with speeds of 1·8 m.p.h. and 2·2 m.p.h. up and down stairs respectively. Working figures were obtained on which designers can base dimensions of subways and stairs. The results have confirmed the previous London Transport methods of calculation as roughly correct.

LETTERS TO THE EDITOR

(*The Editor is not responsible for opinions of Correspondents*)

Passenger Timetables

July 30

SIR,—The recent rationalisation of the Regional boundaries of British Railways, provides a good opportunity for the rationalisation of the Regional timetable booklets. I refer particularly to the Eastern and London Midland Regions, neither of which is completely covered by the booklet that ostensibly belongs to it. For instance, a journey from Lincoln to Southwell takes place entirely within the Eastern Region, although an intending passenger will get no help from the E.R. timetable. Similarly, the route from Nottingham Victoria to Marylebone is entirely within the L.M. Region, but is mentioned only in the summary timetables of that Region's booklet.

Yours faithfully,

A. D. F. HOWARD

30, Bailgate, Lincoln

Locomotive Liveries

August 10

SIR,—It is pleasant to see L.M.S. Pacifics in the London Midland Region appearing again in their rightful crimson lake livery after a dreary 15 years of black and latterly dull green, relieved only for a short time by the relatively more pleasing blue.

It is hard to see why this embellishment should be confined to about 20 engines of the largest class. This means that still no red engines are seen in the Midland section, the line which above all others cries out for the restoration of a livery which by long association has become practically its birthright. The newly re-adopted colour is inherited not only from the former L.M.S.R. but from the old Midland Railway, on which it had been in use with slight modifications as regards lining-out, since the 1880s. The latest engines in the new colours have a modified design of lining to the tenders, a double yellow line separated by black, which is very much like the original livery used by Johnson up to about 1903, but slightly simplified by Deeley into the single yellow line and black edging which have remained ever since.

It cannot be more expensive to paint the engines lake than in the G.W.R. green—very suitable for Great Western engines, with their abundance of brasswork, but drab on L.M.S., L.N.E., and S.R. engines. All express types allocated to the L.M. Region, at present painted green, including the "Britannias" and No. 71000 *Duke of Gloucester*, should revert to red.

Swindon does not now confine its lined-out green to express types, but applies it also to small passenger tank engines to great advantage, and even to some of the smaller British Railways standard types.

Yours faithfully,

H. C. CASSERLEY

Ravensbourne, Berkhamsted, Herts.

Smoking in Trains

August 8

SIR,—I am sorry Mr. S. L. Eccles, in his letter published in your August 8 issue, favours those not prepared to show consideration towards a minority provided for nowadays by a modest proportion of non-smoking compartments. Just as the non-smoker has to search for this minority of suitable accommodation, he can surely on a reciprocal basis expect the smoker to undertake the easier task of avoiding it?

Mr. Eccles' contention that trouble occurs only in crowded trains suggests that non-smoking accommodation may still be too generous; it makes no case at all that there should not be some place in a train where, especially on a long journey, those who cannot tolerate tobacco should be certain of its absence. If a smoker wants a seat more than he wants a smoke, then the choice is his; if he wants a smoke he should at least glance to see that he is not entering a non-smoker.

Yours faithfully,

B. JOHN PRIGMORE

11, Chilmark Gardens, New Malden, Surrey

THE SCRAP HEAP

Not a Station Nameboard

A dental laboratory owner last month lost the metal nameplate from his front door. He has now heard from the lost property office at Waterloo Station that he can have it back for a fee of 2s. 6d.—*From the "Daily Mail."*

Brussels Railway Museum

Europe seems to be following the example of U.S.A. in a belated enthusiasm for preserving railway material and relics. Belgium, where the public has never shown much interest in railway matters, other than a purely utilitarian one, has followed suit. Last month the Belgian Railway Museum was re-opened in the new Brussels Nord station. The collection, begun in 1951, was formerly displayed in the old Nord station building fronting on the Place Rogier, but was placed in store when this was demolished a few years ago. Except for the locomotive *Pays de Waes* (1842) and a replica of *Puffing Billy*, the displays consist mostly of scale models. A new feature is a section devoted to Belgian railways during the last war; exhibits include a parachute container for dropping explosives to the railway resistance movement in the Ardennes.

Twelve-Coupled Locomotives

Reference was made in an editorial note in our July 11 issue to 2-12-2T locomotives built in 1912 for Java; the present state of these, we observed, was unknown. Maschinenfabrik Esslingen informs us that five replacement boilers for these locomotives were supplied by that firm to Java in 1954, so that some at least of the class can be assumed to be still in service. Attention also is drawn to 0-12-0 and 2-12-2 rack locomotives still running on the Austrian Federal Railways. In 1955, Esslingen delivered two 0-12-2T oil-burning, bar-frame, metre-gauge rack locomotives to the General Belgrano Railway of Argentina, for working on the line leading to Bolivia via Tucuman and Jujuy. These engines were described and illustrated in our issue of December 23, 1955; one is depicted in the accompanying illustration. They appear to be the last 12-coupled steam locomotives built in any country.

The Evils of Subsidy (1898)

In Algeria, we learn from the British Consul's report, mule-cart trains are still able not only to compete with, but to more than hold their own against, the railways, all but one of which are State subventioned, and long lines of heavily laden carts are to be seen plodding along the roads parallel to the railway lines. Yet the five subsidised railways of the Colony draw from the Government annually not less than £1m. sterling. There appears to be a very important screw loose in Algerian railway management.—*From "The Financial Times" of August 8, 1898.*

Tribesman's Viewpoint

The following is part of a translation, published in *Indian Railways*, of verses by a Naga tribesman in North East India; many Nagas living near what is now the North East Frontier Railway have retained their tribal way of life, but compromise by occasional travel by train and conversion of fishplates and other items of railway equipment into hunting spears:

"When I looked down from the hill-top of my village to the valley far far below, beyond the zigzag river blue, I saw a long long row of houses moving on towards the horizon, puffing back the smoke of a cigar. It was a train. Then, one day, I happened to go down to the valley to buy salt for our festival. . . . I could then see . . . lines which seemed to join at the end, to my uncultured eye, though I now understand that they were a pair of parallel lines.

"Over these lines one day I heard the train coming furiously, making sounds as if the common signal drum of our village was beating rub-a-dub-dub. The sound became more distinct as the train neared the station. . . . It had sounded its arrival from a distance on the whistle, tri—tu—tu. The first time I fled away to hide myself under cover somewhere, but before long I knew it was just a train."

Train Robbery Foiled

What might seem to be scenes from an early Wild West film actually took place a month ago in Argentina. The driver of a passenger train arriving at Mercedes Station on the D.F. Sarmiento Railway reported that at a level crossing outside the town some masked men were waiting in a motor-car, and another man had climbed a telegraph pole with a portable telephone and was evidently tapping communications. As the monthly pay train with 1,000,000 pesos was due to leave after crossing with the passenger train at Mercedes, the police were advised; but the alarm was given by the wire-tapper, and the masked men escaped. They went on to J. F. García Station and apparently had not given up hope of holding up the pay train. In view of this, the pay train was cancelled and the coach conveying the money was attached to an express guarded by troops.

Scottish Region Diesel in Film

A film of John Buchan's "Thirty-Nine Steps" now planned is reported to include a sequence in which a passenger jumps from a diesel on the Forth Bridge; that is not, as far as we can remember, an episode in the book, which was published in the very early days of diesel traction.

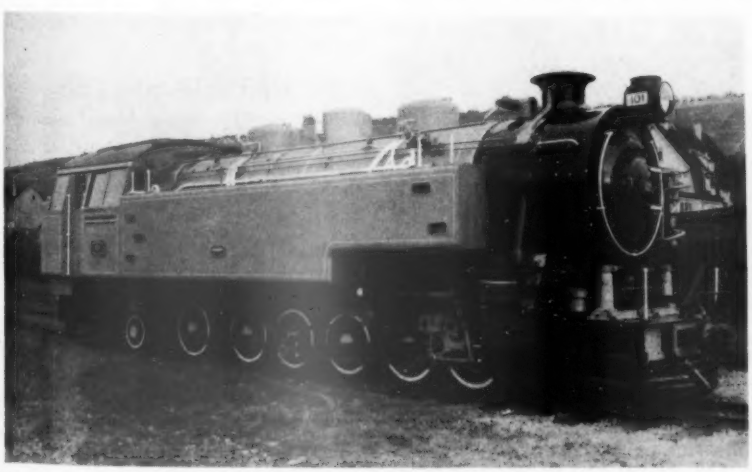
"Your Policemen Are Wonderful"

Let those who rifle, rob and plunder
Beware this blue-clad British wonder;
Pastmaster of perambulation,
He circumnavigates the station,
Alert to any chance of catching
The odd expert at baggage-snatching
And keeps a minatory eye
On lesser lights of larceny.

Controlling crowds and cars and queues
He shepherds "headlines" in the news,
Screen-darlings, V.I.Ps and boxers,
With their attendant bobby-soxers,
And views with equanimity
The train-spotting fraternity.
He knows the lot, from A to Z,
Calm and serene, he keeps his head,
Equal to any situation,
Though not immune to perspiration
Should he be called on to control
The devotees of "rock 'n roll."

Long may each paragon in blue
His peace-preserving paths pursue,
Continuing, until the end,
Guide and philosopher and friend.

A. B.



One of two 0-12-2T metre-gauge oil-burning rack locomotives supplied in 1955 to Argentina

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Further C.T.C. Installations

Centralised train control has been extended to cover a further six sidings from Sawmills to Nyamandhlovu. The section of line from Wankie to Nyamandhlovu, some 175 miles, is now controlled by two panels situated at Dett and Sawmills. Work is now proceeding on the installation of C.T.C. from Nyamandhlovu to Mpopoma, Bulawayo. The latest extension to this installation was brought into operation on August 12.

VICTORIA

Automatic Boom Barriers

Automatic boom barriers replaced the hand-operated gates at the Middleborough Road level crossing, and flashing light signals came into operation at the Cemetery Avenue crossing, between Box Hill and Blackburn, on July 2. Associated with boom barriers are flashing light signals and bells, which give preliminary warning that the barriers are about to descend. This is the eighth installation of its kind since the first automatic boom barriers were introduced at Toorak Road, Tooronga, in February, 1956.

Gauge Conversion and Electrification

Good progress is being made on the re-alignment, conversion to broad gauge, and electrification of the Upper Ferntree Gully-Gembrook railway line as far as Belgrave. The three-mile section of 2-ft. 6-in. narrow-gauge line between Upper Ferntree Gully and Belgrave has been dismantled, and a bridge to replace the existing level crossing some 650 yd. east of the Upper Ferntree Gully station is in course of construction. It will be 140 ft. in length and will have a concrete substructure and a steel and concrete superstructure. A bridge of similar design, 190 ft. long, is to be built over the main road near Kia-Ora Avenue, and the existing timber bridge spanning the cutting west of Upwey Station will be replaced by a steel and concrete bridge 110 ft. long. Work has also begun on a large reinforced concrete culvert that will replace the existing underline timber bridge at Ferny Creek. New stations will be built at Upwey, Tecoma, and Belgrave and extensive re-arrangement is planned for Upper Ferntree Gully station yard. It is hoped that the line will be in use in the latter part of 1960.

Bulk Cement Wagons

The railways are expanding the existing fleet of special "CJ" bulk cement wagons from 39 to 50. These wagons each have a capacity of 44 tons. For rapid discharge of the cement from the rail wagon to road tanker or storage silos, a number of the wagons are being equipped with screw conveyors. The remainder of these wagons discharge by dumping into a pit through bottom outlet doors. Seven "CK" wagons, each of 20 tons capacity and formerly used to transport pulverised brown coal, are being altered for pneumatic discharge of cement by air blast through a flexible hose.

Container for Liquid Fats

A prototype insulated container for the transport of liquid fats by rail from Sydney to Melbourne has recently been put into service. The unit, manufactured by a New South Wales engineering firm, is a cylinder some 6 ft. in diameter and 8 ft. long, with an overall height of 7 ft. An inner tank of stainless steel is insulated with 3 in. of cork. Placed horizontally on a base, similar to that of the Victorian Railways "L.C.L." container, it can be carried on Victorian Railways K.C. and New South Wales Railways F.M.E. wagons. The capacity is 1,200 gal. for a contents weight of about 4¼ tons. The liquid is loaded through a top manhole and discharged through an outlet valve at one side of the cylinder. Steam jackets enable the liquid to be heated for easier discharge. Four lugs are fitted for lifting and lowering the unit.

NEW ZEALAND

Wagons Welded to Ship's Deck

Thirteen refrigerated meat wagons were recently shipped to New Zealand from Brisbane welded to the deck to prevent movement in any heavy seas encountered. Shortly after the vessel berthed at Lyttelton, a gang of welders from the Addington railway workshops began burning off the fastenings. The wagons, built in Australia, are 37 ft. 6 in. long x 8 ft. 6 in. wide and 11 ft. 6 in. high. Brine tanks fitted behind the bulkheads of the wagons constitute the special cooling system. They are filled with ice and 10 per cent brine solution through the roof hatches. Air circulating around the tanks cools the main chamber of the wagon to below freezing point.

UNITED STATES

Chicago Line Seeks Abandonment

The Chicago, North Shore & Milwaukee Railroad has filed petitions with the Interstate Commerce Commission and the regulatory commissions of Illinois and Wisconsin seeking authority to abandon its entire line. During the twelve years from 1947 to 1958 inclusive the losses have totalled $4,312,562, and are on a mounting scale, as the loss over the first quarter fo 1958 was $120,179. Attempts to sell the line have failed. The C.N.S. & M. operates 90 miles of line between Chicago and Milwaukee, with an 8-mile branch from Lake Bluff to Mundelein; the Shore Line route along Lake Michigan between Chicago and Milwaukee was abandoned three years ago. Its electrically-operated trains have long been noted for their

Diesel Working in Western Australia

The first 790-h.p. A1A-A1A diesel-electric locomotive from the Rocklea Works of the English Electric Co. (Australia) Ltd., with diesel engine and electrical equipment from the English Electric Co. Ltd. in Britain, on test run from Midland to Watheroo, Midland Railway of Western Australia. The load of 453 tons is the largest ever hauled on this 3-ft 6-in. gauge line

high speed, with many short start-to-stop runs timed at 60 m.p.h. and over, but its overall times between Chicago and Milwaukee are slowed down because at both ends of the journey trains must travel through city streets.

Thus the C.N.S. & M. is unable to compete effectively with the Chicago & North Western and Chicago, Milwaukee, St. Paul & Pacific Railroads, the fastest of whose non-stop streamline trains cover the 85 miles between Chicago and Milwaukee in 75 min., nor with road transport. Opposition to the abandonment is being organised immediately by State and local government officers and by a hastily-formed commuters' protection association.

CANADA

Diesel Maintenance Courses

Canadian National Railways increased its diesel educational programme last year, and enrolment in these training courses totalled 3,085 by October 31, 1957. Some 2,800 staff have completed the basic course for engine maintenance and are now taking further courses to become familiar with details of diesel locomotives of the various builders.

SWITZERLAND

Martigny-Châtelard Railway

The three new motor coach sets of the Martigny-Châtelard, of which the first went into service in 1957, have permitted a considerable acceleration over this route linking the Rhone Valley with Chamonix. Journey times between Martigny and the frontier station of Vallorcine have come down from 82-90 min. to 60-67 min., and between Martigny and Chamonix, through introduction by the French National Railways of new stock also, from 2¼-3 hr. to 1¾-2 hr.

Each train set consists of a 760-h.p. motor coach and driving trailer together seating 16 first and 107 second class passengers, and weighing 52 tons. Over the rack-equipped sections of the line a speed of 10.2 m.p.h. can be maintained up a 1 in 5 gradient, and 8.7 m.p.h. when descending; over the adhesion sections speeds up to 31 m.p.h. are permitted on the metre-gauge track. The line is unique in Switzerland in using 800 volts d.c., collected from overhead conductors between Martigny and Vernayaz and from third rail elsewhere.

The braking systems comprise electric regenerative and electric shoe braking, compressed air and hand brakes. Brakes are applied automatically by a governor if 10 m.p.h. is exceeded on a rack section.

FRANCE

Movement of Long-Welded Rail

Laying of long lengths of welded rail on the S.N.C.F. involves movement of 944-ft. lengths by rail. A special technique has been evolved for unloading this from the train of flat wagons on which it is moved. The brake van is removed from the train and the end wagon is fitted at each side with special channels equipped with rollers. When the train reaches its final destination, cables are attached to the end of the rail and secured to the track. The train then moves slowly forward and the rail, guided by the rollers, passes through the channels and is deposited on the track. After final installation the rail is welded *in situ* into lengths of some 2,800 ft.

Diesel Haulage in Loire-Gironde Area

Since the end of 1956, the S.N.C.F. has been engaged in converting entirely to diesel operation the area between the Loire and Gironde, covering principally the Bordeaux—La Rochelle—Nantes line in the west with connections to Poitiers and Angoulême, with certain other lines. The first stage was completed between December, 1956, and July, 1957, with the introduction into the area of 15 1,800-h.p. main-line C-C diesel locomotives. The second stage, which will be inaugurated shortly, provides for placing in service a further 30 diesel locomotives of either 1,800 h.p. or 1,400 h.p. and some B-B locomotives of 850 h.p. Works involved include conversion of La Rochelle locomotive depot. A fuelling, lubrication, and sanding plant has been set up at La Rochelle Station, away from the main depot. Special classes have been started for footplate and maintenance staff. This area was chosen for conversion to diesel because traffic density did not warrant electrification, more particularly in view of the lack of generating stations in the area. It is near to oil producing and refining centres.

HUNGARY

Increased Traffic

During the first six months of the current year the State Railways carried 7 per cent more goods and 11 per cent more passengers than in the corresponding period of 1956. In that period, 15 heavy steam and eight diesel locomotives, 21 passenger coaches and 25 freight vehicles were placed in service.

Railway Exhibits at Brussels

(*See our July* 18 *issue*)

Photos]

Some of the 50 *motive power units and passenger and goods vehicles from seven different countries, displayed in the "international station"*

[*J. H. Price*

Transfesa refrigerator wagon, with equipment for changing axles at the Franco-Spanish frontier

Seventeenth International Railway Congress

Long Welded Rails

Their welding, transport, laying, fastenings, economics and maintenance

QUESTION 2 to be considered at the forthcoming session of the International Railway Congress in Madrid concerns the welding and use of long welded rails and related subjects. It was addressed to two groups of railway administrations; the replies of those in the first group were summarised in our issue of May 30 last. Those of the second group—mainly European Continental railways—were collated by Senor A. Crespo Mocorrea, Chief of the Planning & Modernisation Department, Spanish National Railways. This questionnaire is divided into five parts: (1) Definition of long rails and statistical data; (2) uses and value of long welded rails (L.W.R.); (3) their manufacture; (4) laying; and (5) maintenance of track laid with L.W.R.

There was no agreement among the administrations consulted in the definition of L.W.R.; Senor Mocorrea included in his report a four-page table giving the replies of 21 administrations to 14 statistical questions. These included the overall length of L.W.R. on each railway system, maximum temperature variations, types of sleeper, fastenings, ballast, expansion devices if any, joints at ends of continuous lengths of welded rails, and whether rubber pads were used under them. The longest continuous lengths are: in France 170 km. (106 miles) and in Western Germany 125 km. (78 miles). Various types of sleeper are used according to most of the replies. The most common fastenings used are the "K" (rigid clip and bolt and grooved-plate type) standard in Germany, and the French double-elastic clip type, and modifications of both.

The most usual practice is to flash-butt weld normal-length rails into the longest lengths that can conveniently be carried to site and there these are thermit welded into L.W.R.-lengths. Rubber pads are used on those railways adopting the double-elastic clip, and thin poplar plates on those equipped with "K"-type fastenings.

Advantages of L.W.R.

All administrations agree that lines laid with L.W.R. provide the best method of obtaining at once smooth running and a decrease in maintenance costs; there is as yet insufficient experience available to assess these costs accurately, but the least optimistic administrations put the savings at 15 per cent. Nor is it yet possible to decide whether L.W.R. affect rail-corrugation.

It is interesting to note that the German Federal Railway engineers recorded stresses as high as 28 kg. per sq. mm. in flash-butt type welds as compared with 32-34 kg. per sq. mm. in the case of test pieces of unwelded rail. By using automatic welding machines they get results involving practically no breakages, in fact, only 1½ to 3 per 100,000 welds; the corresponding figures for thermit welding are 10-18. The flash-butt method also costs 33 per cent. less than thermit welding.

Most Suitable Length

Though other railways have decided upon 1,000 and 1,500 m.—and in some cases several km.—the French have standardised 800 m. as what they consider the most suitable length of L.W.R., with expansion joints at both ends. The S.N.C.F. allows L.W.R. on high-speed lines provided that the curves are of 800-m. rad. and over, even if there are differences of ± 40° C. compared with the temperature at which the rails were laid. However, lateral resistance tests have shown this figure could be reduced to 500-m. rad. if "R.S." concrete or Laval longitudinal sleepers are used. The minimum radius in Spain, Russia, Poland and Switzerland is 600 m., presumably even with wooden sleepers. On metre-gauge systems, however, it is as low as 200 m. or less. Opinion on the use of expansion devices is divided. Various types of expansion joints are illustrated.

It is generally agreed that, provided reliably-secure fastenings are fitted, wooden sleepers can be laid under L.W.R., but steel and concrete sleepers with their higher lateral resistance are considered to be preferable with tight-lasting fastenings. Whatever the types of sleeper used they are generally laid at the same spacing, and the same kind of ballast is used. The latter should have an adequate shoulder beyond the end of the sleeper to withstand side thrust. The Germans specify a 0·35-m. shoulder on both straight and curves for all types of sleeper. They also strengthen the ballast by compressing its side-slopes mechanically with a special vibrating and ramming machine. On curves of less than 500-m. rad. anchorages are used. The majority of the Continental railways do not increase their ballast sections for L.W.R., but the Dutch and Polish do so on curves.

Fastenings and Anti-Creep Devices

Though the "K-GEO" type of fastening, already mentioned, is standard on German, Austrian, and Belgian railways—with all kinds of sleeper—for L.W.R. track, experiments are in hand in Germany to find the most suitable type. Many other administrations favour the "GEO" fastening. The elastic "RN" clip fastening, previously described and illustrated in our pages, is in service not only in France but in many other countries on various kinds of sleeper. The only elastic spikes reported to be in use with L.W.R. are in the Tauern Tunnel in Austria and on the Italian railways. Coach screws are unsuitable.

Anti-creep devices are widely but not universally considered necessary in connection with long continuously-welded rails. The Germans fit them for distances of 50 m. at each end of a length of L.W.R., mainly, it seems, to insure resistance to longitudinal movement in the rails should the fastenings work loose in course of time. Several other countries agree with this policy when no expansion devices are fitted. The French, on the other hand, hold the opposite view, as they consider that when there is no expansion device allowing of considerable movement, anti-creep measures of any kind are useless; many countries agreed with this argument.

All administrations consulted agree that the final tightening up of L.W.R. must be caried out at or very near the annual average temperature. Newly-laid L.W.R. track is not subject to special speed restriction on European lines except in Poland, where there is a 30 km. per hr. limit in force for three days only. Restrictions are, in fact, similar to those imposed on newly-laid ordinary permanent way.

Maintenance Methods and Costs

Long welded track has not yet been in general use for a sufficient length of time to enable decisions to be taken as to the most suitable type of maintenance to be adopted for this kind of line, or for final regulations on the subject to be laid down. Meanwhile, most administrations have issued provisional instructions, and those in force on French and German railways seem likely to be the basis for ultimate policies. In most countries mechanical packing is preferred, but in many it is supplemented by shovel-packing.

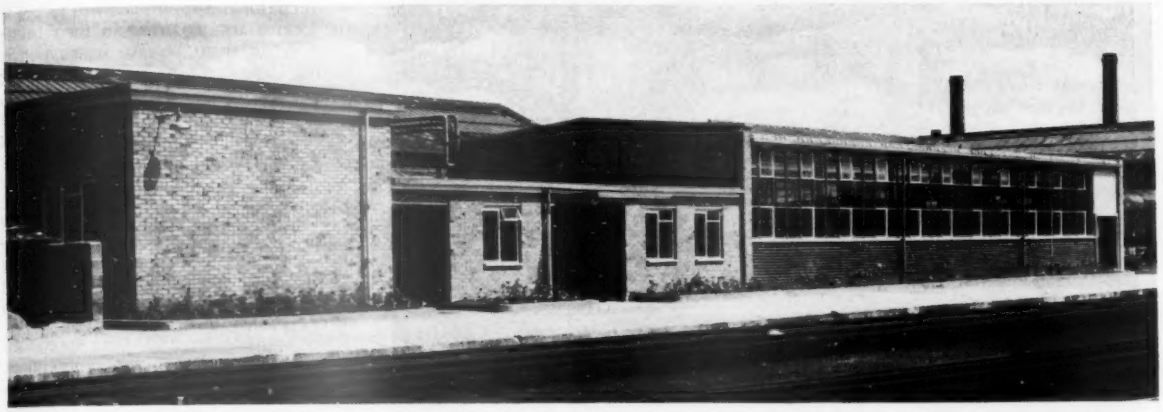
The duration of the period of stabilsation of L.W.R. track depends largely on speed and weight of traffic and other local conditions. It varies considerably on different railways as does the number of platelayer-hours required. In France, for instance, where the period is about a year, the S.N.C.F. employs some 500 platelayer-hours per km. of line on annual maintenance. The corresponding Belgian figures are 600 with wooden and 1,000 with concrete sleepers.

After stabilisation, however, the men-hour figures are considerably lower than for jointed track; for S.N.C.F. main lines the estimated figure for

(*Continued on page* 244)

Apprentice Training Centre at L.T.E. Acton Works

Centralised tuition in railway mechanical engineering



Training centre for railway engineering apprentices at London Transport Acton Works, showing (left to right) the lecture room, main entrance and workshop

THE Apprentice Training Centre at the London Transport Executive railway works at Acton was opened by Sir John Elliot, Chairman of the Executive, on August 7, as recorded in our August 15 issue.

The centre is a separate single storey building which can accommodate some 25 apprentices; it brings together in one place for the first time all the instructional facilities for apprentices undergoing training at the works.

The apprentice training scheme of the department of the Chief Mechanical Engineer (Railways) was reviewed and re-organised in 1947; the number of apprentices was increased and the number of trades taught extended to nine. The present establishment allows for 112 apprentices, based on a five-year course; the majority are in the mechanical fitting, electrical fitting and body-making trades, with a minority from sheet metal working, armature winding, coach painting, coach trimming, wood machining and blacksmithing.

Recruitment

When the school leaving age was 14, boys tended to take up whatever employment was available until they were old enough for an apprenticeship, that is, 16 years old. This meant that a large number of boys abandoned their studies completely on leaving school and, in consequence, it was difficult to find the right type of boy at the age of 16. This difficulty was overcome by interviewing the boys before they were 14, and advising them on the best course of employment and evening schooling.

When the school leaving age was raised to 15, another problem arose, as the actual date of leaving could vary from a whole year to a few months prior to the commencement of the apprenticeship. At the same time, a considerable proportion of recruitment was effected from the technical colleges and grammar schools, where the leaving age is generally between 16 and 18. Latterly, however, there has been a marked tendency for the secondary modern schools to provide adequate full time education up to the age of 16, so that it is rare for any boy to enter Acton Works today other than direct from one type of school or another. The practice of interviewing before taking up apprenticeship continues and this enables a boy to receive advice for some two years in advance, as well as during his apprenticeship, on matters affecting his career. A close liaison is maintained with the schools in this important matter.

Threefold Objective

It was decided to build a separate Apprentice Training Centre at Acton, with the threefold object of introducing the boys to workshop conditions and giving them a good grounding in basic workshop principles; furnishing instruction in the care and use of basic hand tools and, where applicable, machine tools; and giving advanced specialised tuition at the later stage of apprenticeship. The provision of this centre also makes it possible to concentrate the instructional work which hitherto has had to be spread throughout the various shops in the Works.

The building is divided into a workshop, lecture room, locker and wash rooms, supervisor's office and waiting room. In the design and equipment of the building, the aim has been to construct good surroundings which will instil a sense of responsibility in the apprentices and result in their taking a pride in the appearance of the centre.

Care has been taken to ensure that the lighting, ventilation and heating are of a high standard, and the layout of the machines and other equipment has been planned to take full advantage of this. The internal decoration gives an air of brightness not always associated with industrial establishments.

The equipment installed in the workshop includes vice stands, fitting and wood-working benches for hand tool instruction, and a variety of machine tools of the normal production type for elementary operations and for advanced instruction in setting up. Appropriate grinding facilities have been installed for the various classes of tools involved and, for instructional purposes, a forge and gas muffle have been installed for small tool work. Other items are a fly-press, hand bushing press, bar straightener, pin drill, power saw and material rack. Arrangements have been made to ensure extraction of dust and fumes from grinding, forge and muffle operations.

The lecture room is separated from the workshop and other offices by a corridor. Accommodation is arranged for 30 persons, seated two at a table. There are facilities for film projection and the use of an epidiascope for which a roll-up projection screen is fitted at the end of the room. A large wall-type blackboard with hinged panels is also arranged.

The supervisor's office, adjoining the workshop, has an observation panel which allows an overall view of the workshop; a waiting room has also been arranged next to the office. Wardrobe-type lockers and seats have been installed in a separate locker room.

Of the 112 boys in the Apprentice Training Scheme, only about 25 will be undergoing instruction at the centre at any one time; the remainder will be gaining practical experience in one or other of the shops in the Works or in one of the main railway depots. The initial period to be spent by every apprentice in the centre will be from three months to one year, according to the trade.

Every apprentice is engaged on a three months' probation, which ranks as part of the apprenticeship, after which indentures are signed. This pro-

Interior of workshop with various machine tools (right) and benches, grinding machines and vice stands

bationary period will be spent on instruction in the care and use of hand tools, production of exercise work and simple tools of the carbon steel variety; the intention being to demonstrate the principles of tool making but not to become involved in the technicalities of high-speed steels and carbide-tipped tools at this early stage.

Later, more advanced instruction will be given and production of selected items of equipment undertaken, these being selected for their instructional value. This type of training has been going on in the past but under less favourable conditions, and a much more concentrated instruction can now be given.

The curriculum will not differ from that hitherto applied but, because of the accommodation now available, the boys will all commence their apprenticeship following the close of the academic year; the schedules of training are therefore being modified to provide for parallel advancement throughout the workshops instead of on the "single file" principle which has been followed previously.

Mechanical apprentices will return to the centre for a period in their fourth year in order to receive instruction in setting up capstan lathes and other advanced work on machine tools. Bodymaker apprentices will also return in their fourth year for advanced work and instruction.

Lecture Room

The lecture room is intended for formal lectures as distinct from practical instruction from the staff. These lectures will be talks about the Executive undertaking and organisation, career opportunities for young probationer apprentices, and more specialised subjects for the older apprentices. Lectures will not be given in connection with part-time educational studies, nor in any way replace such studies, because it is considered that adequate facilities exist for all apprentices in the official educational establishments in the London area.

The apprentice training scheme is under the general supervision of Mr. G. S. Bingham, Mechanical Engineer (Works—Railways) with Mr. C. I. Birkbeck as Apprentice Controller. In direct charge of the training centre itself will be Mr. B. Williamson, Apprentice Supervisor.

The training centre was designed by the Architect to London Transport Executive, Mr. T. R. Bilbow, and the main contractor was Chas. Booth & Sons (Contractors) Ltd.

Long Welded Rails

(*Concluded from page* 242)

maintaining a km. of line is 200 hr. a year less than for a normal line.

Whilst it is extremely difficult for railway administrations to estimate the lives of the various components of L.W.R. track, the reduction in the number of joints—the most vulnerable and costly parts to maintain—must require much less maintenance and also lessen batter and other damage to the rails. Viewed from different angles, L.W.R. in France may be expected to effect a saving of 24 per cent in maintenance as compared with normal track, and in Western Germany 17 per cent; in the latter country, moreover, it has increased the period between overhauls from three to five years. Both Belgium and Italy place the saving effected as about 15 per cent.

Breakages, Buckling, and Creep

Incidents on sections of line laid with L.W.R. have been few, and any that have occurred have almost invariably been due to faulty workmanship, such as defective welds or tightening up the fastenings at temperatures differing too widely from those laid down. Some railways have had no incidents at all to report, and others have had a few such as breakages, buckling, and creep. Most breakages have been due to badly-made welds, and buckling has resulted from insufficient regard to temperature regulations, or in one case due to the use of too-light a gravel ballast. Creep has occured on only one railway as a result of packing being carried out at temperatures too remote from that at which the line was laid. Regulations are now in force on most lines limiting the remoteness. Shovel-packing has been forbidden on some systems and replaced by mechanical packing; opening-out is also limited to three or four sleepers at the same time.

Results already obtained with L.W.R. make it possible to hope that the practice will develop very rapidly in common with progress in technique generally nowadays, and it bids fair to be the greatest advance made in permanent way to date.

BRITISH STANDARD FOR RETURNABLE WOODEN CRATES FOR VEGETABLES.—This Standard, BS.3018:1958, in a series for horticultural containers prepared at the request of the Ministry of Agriculture, Fisheries & Food. It is felt that standardisation will eventually be helpful, and the crate covered by this Standard has been designed in an attempt to find something which is a compromise between the wishes of growers in various areas. Regard has been given to such factors as efficient packing and ease of stacking and handling. Copies of the Standards may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. The price is 3s.

CIVIL ENGINEERING SCHOLARSHIP TRUST AWARDS.—The names of 11 youths who have been awarded the first scholarships to be provided under the Civil Engineering Scholarship Trust have been announced. These scholarships, worth on average nearly £400 a year each, will enable young men to start a three- or possible four-year course for a civil engineering degree at a university this autumn. The Trust received 117 applications for scholarships, and the 11 successful candidates were chosen on the basis of character and academic ability. The Trust is to continue to award scholarships annually and expects to increase the number available next year.

IMPROVEMENTS AT NAVIGATION ROAD, ALTRINCHAM.—A new booking office and booking hall are being provided at Navigation Road, on the electrified M.S.J. & A. Line of British Railways London Midland Region.

ELECTRIC RAILWAY TRACTION SECTION

Atomic Power Prospects

NEXT week the second International Conference on the Peaceful Uses of Atomic Energy in Geneva will remind the world by the scope and complexity of its proceedings that it is a hard road to the goal of cheap and abundant atomic power. In the associated exhibition, the stands of British electrical and mechanical engineering firms, many of them well known in traction, will present a picture of the vast capital investment in research and development with which private industry has supported the national need for new sources of energy at home and as an export asset. The rapid expansion of nuclear power in Britain envisaged at the beginning of 1957 has itself brought a new problem, for whereas it had been estimated in the White Paper of 1955 that the cost of power from nuclear plants, at 0·6d. a unit, would be approximately the same as that from the conventional generating stations then being designed, this figure was based on the asumption that the nuclear stations which were then proposed would operate as base load stations with an annual load factor of 75 per cent.

Sir Christopher Hinton, Chairman of the Central Electricity Generating Board, reminded the British Electrical Power Convention at Brighton earlier this year that by 1970, under the present programme, nuclear capacity would exceed the continuous load on the system. The stations would therefore be required to operate with load factors under 75 per cent, and they would be competitive with conventional plant only if the capital cost per megawatt had been reduced considerably. Failing that, the alternatives would be either to generate power in nuclear stations more expensively than with conventional steam plant, as might be necessary if there were to be a serious shortage of coal, or to swing back to the use of conventional power stations. The problem is partly one of attaining flexibility in the operation of nuclear stations so that they may meet different rates of demand economically.

In the light of this, it is easy to see the wisdom of the standpoint adopted by the British Transport Commission that the future for atomic energy on the railways lies with central generation and not with the atomic locomotive, which would not only be subject to all the problems of shielding against radioactivity hazards, but by the nature of its duties would not provide for its power plant the steady and continuous demand necessary for economic use of the energy released by the process of nuclear fission.

Another paper presented at the same convention in Brighton suggested that in some countries nuclear and hydro-electric plant might be complementary producers of power. The proposal was made in a paper by Messrs. J. C. Beverley, E. G. Teasdale, and A. Wilmot of the English Electric Co. Ltd., in which it was envisaged that nuclear plant might be installed to meet the base load, while advantage could be taken of the ready adaptability to varying demands of hydro-electric generators by using them in peak load stations.

Evidently a mistake to avoid in planning power resources is that of allowing enthusiasm for nuclear stations, or misgivings over future supplies of conventional fuel, to lead to an expansion of nuclear generating capacity which outstrips the base load. Railway electrification is making a growing contribution to the latter, and its beneficial effects on the national load factor were referred to in the Weir report of 1925. The useful characteristics of the railway load in sustaining demand outside the peak hours were mentioned by Mr. S. B. Warder, Chief Electrical Engineer, British Railways Central Staff, British Transport Commission, in his address to the British Electrical Power Convention in 1956. At the same meeting Messrs. F. J. Lane and W. B. Noddings of the Central Electricity Authority, as it then was, illustrated this feature with figures based on the Southern Region and Manchester-Sheffield electrifications, which showed that between midnight and 6 a.m. the railway load did not fall below some 52 per cent of peak demand, although other loads were around 40 per cent of peak and fell to some 32 per cent around 2 a.m. These characteristics should become more marked as the electric haulage of goods traffic increases, and suggest that co-operation between railway and generating authorities in planning timetables may make an important contribution to the economic use of the growing proportion of nuclear power to which this country is committed.

Oil-Filled Cables

IN ordering equipment for the first phase of the Kent Coast electrification last year, the Southern Region continued the practice of using oil-filled cable which had been seen first in its London area change-of-frequency scheme. A further contract for this type of cable has now been placed, as reported last week, covering in this case the bulk of the routes included in Phase 2 of the extensions. Among these are the main line from Sevenoaks to Dover via Tonbridge and Ashford, and the parallel route, often used by relief boat trains, from Ashford to Maidstone East, where it connects with the existing electrification to London via Otford and Swanley. A feature of the new contract, which has been awarded to Pirelli-General Cable Works Limited, is that corrugated aluminium sheathing will be used for part of the mileage. This form of covering was installed experimentally between Wimbledon and St. Helier substations, on the Wimbledon-Sutton branch, as part of the London area work carried out by Pirelli-General, and its adoption on a wider scale, both for feeder and pilot cables, may be regarded as confirmation that the advantages claimed for corrugated aluminium sheathing have been borne out in practice. A portion of the trial installation was illustrated in our issue of November 22, 1957. It may be recalled that the oil-filled cable contract for Phase 1 of the extensions was placed with W. T. Henley's Telegraph Works Co. Ltd.

When an aluminium sheath of this type is used, its rigidity enables the filling between cores and sheath, necessary in lead-covered cable to preserve the circular section, to be dispensed with, and external reinforcement against the effects of outward pressure is also unnecessary. A further simplification is the absence of the spiral oil ducts inside the cable, since the oil occupies the whole space between cores and sheath. Corrugation of the sheathing affords greater flexibility than other types of aluminium covering and so facilitates bending of the cable on the drums and during installation. An important gain from the user's point of view is that this light and rigid cable calls for fewer lineside supports than the lead-sheathed type.

Various applications of oil-filled cable in connection with 50-cycle electrification work now proceeding on British Railways have been announced already, so that although feeder requirements are minimised by the high-voltage a.c. system of traction, it is clear that savings in size and weight of cable for a given load made possible by the oil-filled system continue to interest traction engineers for the essential links between the national grid and the railway substations. The Southern Region has already given a lead in the application of oil-filled cables to traction supplies, and its decision to proceed on a wider scale with oil-filled cable having a corrugated aluminium sheathing illustrates how readiness to collaborate in trial installations may lead to results useful alike to the railway concerned, to the manufacturer, and to all concerned with electric traction.

Fully-Sprung Motors

An aid to improved riding of railcars

(By a correspondent)

THE axle-hung motor, which first made its appearance some seventy years ago with tramcars of the Richmond Union Passenger Railway and since became the standard tram arrangement, is also holding its own with locomotives and railcars. The main reason for its sustained popularity is the simple and relatively cheap design coupled with comparatively low maintenance expenses, this applying particularly to the robust d.c. motor.

The introduction of individual axle drive with the single-phase Central European railways, however, where as much as 1,000 h.p. is developed by each motor, lead to a rapid evolution of a large number of flexible drive designs permitting the use of fully-sprung motors. It was sometimes rather altruistically claimed that these arrangements were mainly sponsored to safeguard the permanent way from the

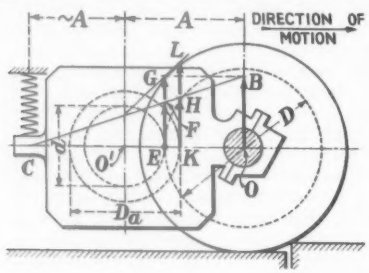


Fig. 1—Vertical forces encountered by armatures of axle-hung motors

effect of severe impacts likely to be imposed by heavy axle-hung motors, but it would also seem that another reason for their use was to protect the less robust a.c. motors from impacts imparted at the rail joints. Another reason for the rapid introduction of fully-sprung motors was the desire to secure torsional elasticity of the drive required to counteract the oscillating component of the torque developed at 16⅔ cycles, particularly during heavy starting. All the same it must be anticipated that the use of fully-sprung motors should in the long run reduce the maintenance expenses as far as vehicles and permanent way are concerned, and thus justify the initial outlay due to the flexible drive, even if the direct benefits might not always be readily traceable as far as the permanent way maintenance expenses are concerned.

The magnitudes of the stresses imposed on the armature of an axle-hung motor are indicated by reference to Fig. 1. The wheels running over a rail joint are accelerated practically vertically, the resultant acceleration being represented by the vector *OB*. At the instance of impact the nose end of the motor at *c* can be considered as unaffected, particularly since this is linked to the sprung part of the bogie frame, the values of accelerations along the line *CO* being indicated by the straight line *CB*. Consequently the highest accelerations will be encountered at the motor supporting bearings at *O*. The magnitude of the acceleration *OB* depends on a number of factors, such as the state of the permanent way, rail joint gap, speed, unsprung weight, and so on, and it is practically impossible to predict it on the basis of purely theoretical considerations in turn based on a considerable number of assumptions. Experimental evidence has shown, however, that the values of *OB* vary between 10 and 20 *g* with a mean value of $a = 15$ *g* encountered at speeds of about 50 m.p.h. The armature is consequently subjected to accelerations of even higher magnitudes. Here at the point of gear meshing *E*, the gear wheel is subjected to an acceleration $EG = OB$, whilst the pinion is required to face the magnitude *EF*. Because of this the pinion and with it the armature will be subjected to an additional acceleration equal to *FG*. At the periphery of the armature, which has the daimeter D_a, this additional acceleration will be *HL* whilst the total acceleration will be represented by *KL*. Since with most axle-hung motors the distance *CO'* and *OO'* are practically equal:

$$KL = HK + HL = a\frac{A+\frac{D_a}{2}}{2A} + a\left(1-\frac{A+\frac{d}{2}}{2}\right)\frac{D_a}{d}$$

and consequently[1]

$$KL = a\frac{1+\frac{D_a}{d}}{2}$$

With an average value of $D_a/d = 2.5$, which applies to most axle-hung motors

$$KL \approx 1{\cdot}75a \approx 25\,g$$

These high accelerations are in the main responsible for the damage inflicted upon axle-hung motors, such as loosening and destruction of the blowers with self-ventilated motors, fracture of armature winding, loosening of field coils, housing fractures, damage to bearings, brush arcing, and fracture.

Improving Riding Qualities

The riding qualities of passenger carrying vehicles are in the vertical plane determined by the frequency and amplitude of the oscillations. The former depends on the sprung masses and inertias of bogies and body, the spring rates, the distance between bogie centres and the rail length. The amplitudes depend upon the ratio of natural frequency of pitching and bouncing of the vehicle, the damping and also upon the magnitude of the forcing obstacle or its equivalent. The notion of an equivalent obstacle is introduced to account for the action of the unsprung mass. When this meets an obstacle it will be accelerated upwards and, other things being equal, the greater the unsprung mass the higher will be its displacement, and consequently the higher the equivalent obstacle as sensed by the sprung system and by the passengers in it. To a certain extent the adverse effect caused by heavy unsprung masses acting like a higher obstacle and thus providing a greater vertical acceleration, can be alleviated by careful matching of the spring characteristics and by the use of suitable dampers, the latter being of benefit also by reducing the downward wheel impact, but here again reducing the unsprung weight is bound to improve matters further.

The unsprung mass of trailing vehicles is usually given by that of the wheel sets, axleboxes and a portion of the primary suspension. The weight of the wheel sets varies very little with the load and as will be noted from Fig. 2 is almost directly proportional to the diameter. More recenty light-weight wheels have been developed and are being used in increasing numbers with some Continental railways in order to

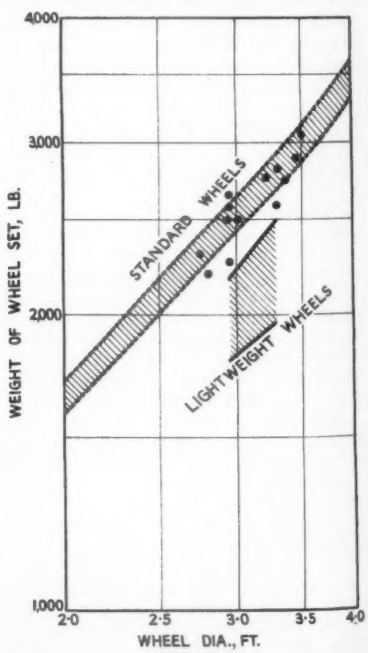


Fig. 2—Representative wheelset weights

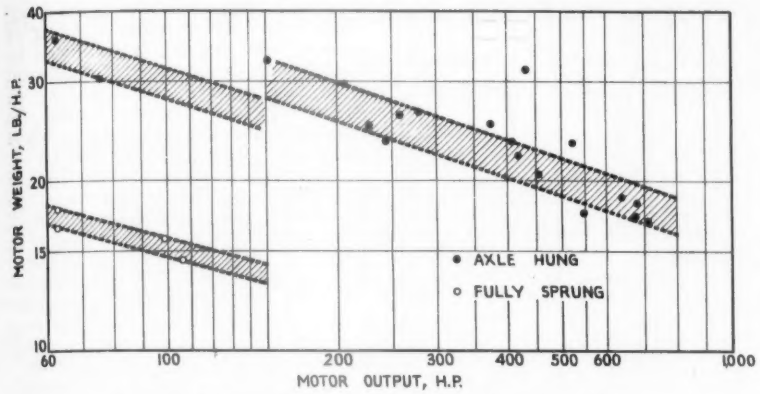


Fig. 3—Representative weights of d.c. traction motors

reduce vehicle weight and also to improve the riding qualities. The data relating to these wheels is also indicated in Fig. 2, the weights being some 25 per cent less than for standard units.

However, as far as unsprung weights are concerned any effort in this direction is negated by the additional weight imposed on the axle by use of axle-hung motors, since some 60 per cent of their weight is axle borne. The weights of representative d.c. axle-hung traction motors are plotted in Fig. 3. Thus a 150-h.p. motor may weigh about 4,500 lb., this increasing the unsprung weight of a 3-ft. dia. wheelset from about 2,500 lb. to 5,200 lb. These values do not include the weights of the gear wheel or the part of the gear case carried by the axle.

Quite apart from the benefits secured by improving the riding qualities and ultimately reducing the maintenance expenses, the use of fully-sprung assemblies permits the development of much lighter motors. This is due to the fact that here the armature shaft is not required to deal with bending loads whilst the motor housing can be circular in cross-section without provision for axle bearing housings. The drive permits the use of smaller pinions and consequently ensures higher gear ratios and higher motor speeds, whilst the maximum vertical accelerations imposed on the motor are reduced in the order of 6 to 1. As the result of these measures it is possible to reduce the motor weight by about 50 per cent (Fig. 3).

Russian Developments

Whilst the number of drives developed for fully-sprung motors is very large, many of these are somewhat complicated; and in addition most torsionally flexible drives also increase the vertical stiffness of the primary suspension. A simple cardan type drive has been introduced with the 36·2-ton type "D" cars of the Moscow Underground[2] built between 1950 and 1954. These cars are 60 ft. 2 in. long and accommodate 44 seated and 220 standing passengers. Motive power is by four fully-sprung motors and the maximum speed is limited to 47 m.p.h. The wheels are 2 ft. 11⅛ in. dia. and can be worn down to 2 ft. 9¼ in. Each motor develops 73 kW. at one-hour rating, the motor weight being 0·7 tons as compared with 1·49 tons for 113-h.p. axle-hung motors used with earlier type "G" 43·7-ton cars. The motor housing which weighs 540 lb. is 1 ft. 8 in. in dia. and 2⅜ in. thick, the motor being 2 ft. 9½ in. long between the end covers, whilst the armature is 10⅞ in. dia.

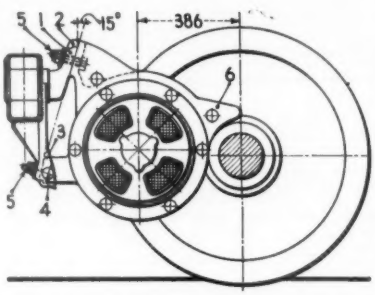


Fig. 4—The arrangement of fully-sprung motors of type "D" cars, Moscow Underground

The motor is mounted in the bogie as shown in Fig. 4 at three points, two at the top and one below. At the two top points the motor housing is provided with feet hooked on to the 1½-in. thick brackets, *1* welded to the bogie frame. The motor feet are extended to form a safety hook *2* so that during assembly the motor can be hooked on the brackets. The single lower bracket *3* is box shaped, the two side walls being sufficiently wide apart to permit lateral alignment of the motor carried out with the aid of 1 in. bolts *4*. The motor is secured in position by three 1-in. bolts *5*, whilst two extension *6* over the axle are provided in case of fracture of the upper brackets.

The cardan coupling, Fig. 5, consists of two identical halves *A* and *B*. Each of these comprises of a joint *1* with two rollers and caps, securing nut *2* and tab washer *3*, fork *4*, housing *5*, securing ring *6*, cover *7* and three long bolts *8*. The two assemblies are located with the aid of a common spigot ring *9* which is 130 mm. in dia. and 14 mm. thick, whilst a paper gasket *10* is provided between the faces secured by three bolts *11*. The joints *1* are about 3·7 mm. in diameter and are made from chrome-nickel steel case hardened to a depth of 0·5 to 1·2 mm. The joint

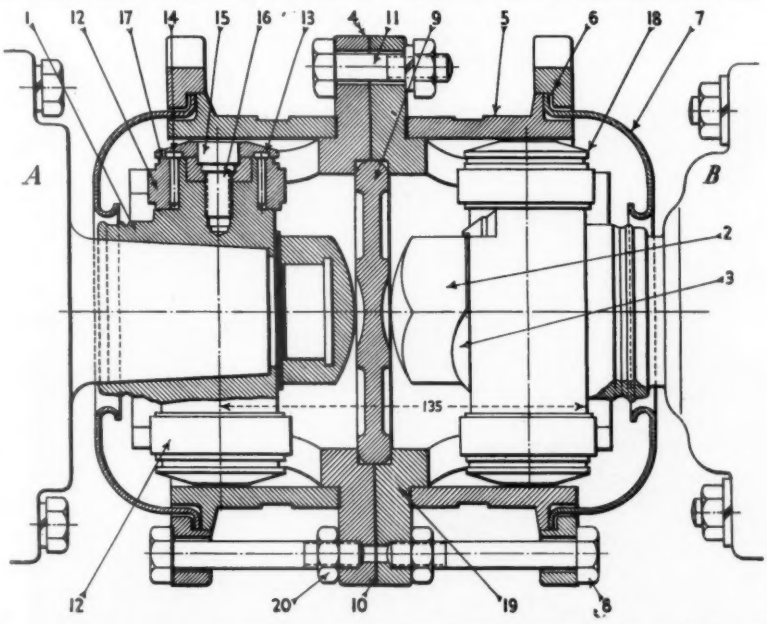


Fig. 5—The compact cardan joint between motor and driving pinion of type "D" cars. A similar drive is also employed with 200-kW. motors of type "ERI" suburban M.U. stock designed for 80 m.p.h.

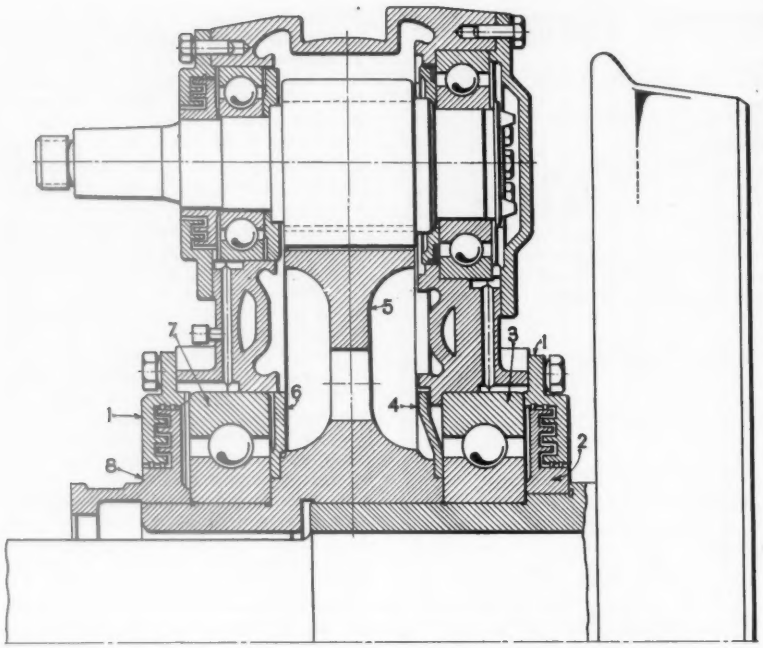


Fig. 6—Axle drive arrangement of type "D" cars with a gear ratio of 5·73 to 1

carries a 20 mm. long ring *12* which has an inside and outside dia. of 43 and 60 mm. respectively, whilst fourty-three 3-mm. needle rollers *13* are carried between the joint and the ring. The end cover *14* is provided to prevent the needle rollers from being thrown out. This is pressed into the head of *1* and secured by the screw *15* and the spring washer *16*. The rotation of cover *14 vis-à-vis* the ring *12* is facilitated by twenty-four $\frac{1}{8}$-in. balls *17*, separated from each other by the cage *18*. A gasket *19* is provided between the housing *5* and the fork body *4*, whilst the bolts *8* are secured by the nuts *20*.

The drive has a gear ratio of 15:86 and since operating experience on Moscow Underground is in favour of single-piece cast road wheels with which the production of an extended boss presents difficulties, the design of the drive shown in Fig. 6 incorporates a gear wheel with an overhung boss carrying the housing bearing, both bearings being of identical diameter.

The drive housing, Fig. 7, is connected to the bogie frame via the die-forged, heat treated link *1*. This is connected to the gear housing at *2* at a point directly below the pinion, this reducing the possibility of misalignment with the motor due to the action of the primary suspension. The housing *3* is connected to the link via a 62-mm. dia. ball joint *4*, the shaft *5* of which is secured by the conical nuts *6*, locknuts *7* and tab washers *8*, lubrication being by the grease nipple *9*. The upper end of the link *1* is secured to the bracket *10*, extending from the bogie frame. This carries two rubber pads *11* which are 150 mm. dia. and 24 mm. thick, and are secured by the nuts *12* and *13* which are also used to adjust the vertical location of the housing. Since the axis of

(*Continued on page* 252)

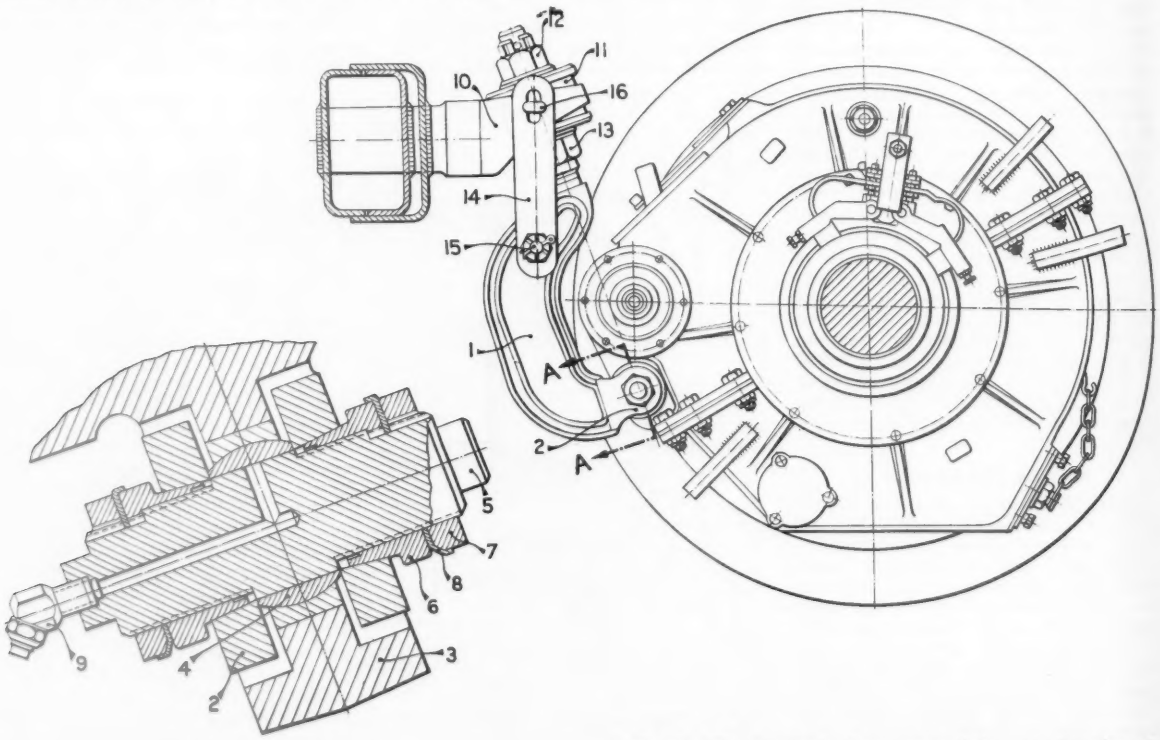
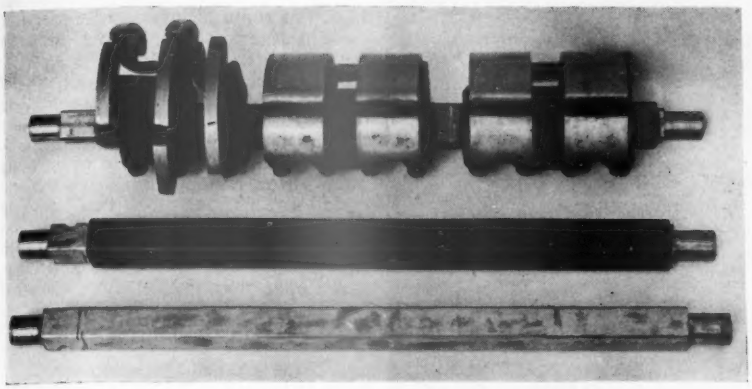


Fig. 7—The method of support of the gear housing at the bogie frame, class "D" cars

Improved Shaft Insulation for Traction Motor Reverser Switches

Development of process using epoxy resin-impregnated glass cloth wrapping



Assembled switch drum and shaft before and after insulation

AN improved method of insulating the shaft on a traction motor reverser switch has been developed by Mechanical Engineering Department of the London Transport Executive at Acton Works. Experiments have been carried out at the works for several years with various types of electrical insulation as applied to London Transport rolling stock. Particular emphasis has been placed on silicone materials; this work was described in an article "Silicones in Traction Motor Insulation" which was published in our April 11 issue.

The switch drum used in the traction motor reverser switch is of the rotating drum type with contacts clamped to a square central shaft insulated for 600 V. Failure from loose clamping caused by the shrinkage of the micafolium and shellac insulation in current use prompted investigation into other methods of insulating the shafts.

Initial experiments in applying the micafolium to the shaft in the normal way with a hot iron, but using a bakelised cement instead of shellac for the final application, proved unsuccessful, and shrinkage still occurred. It was then decided to discard the micafolium as the main insulating medium, and a composition of synthetic resin and mica dust was developed for application to the shaft in a specially-prepared mould. The trial shafts were given a final coating of anti-tracking paint and the contacts clamped directly on to the moulded insulation.

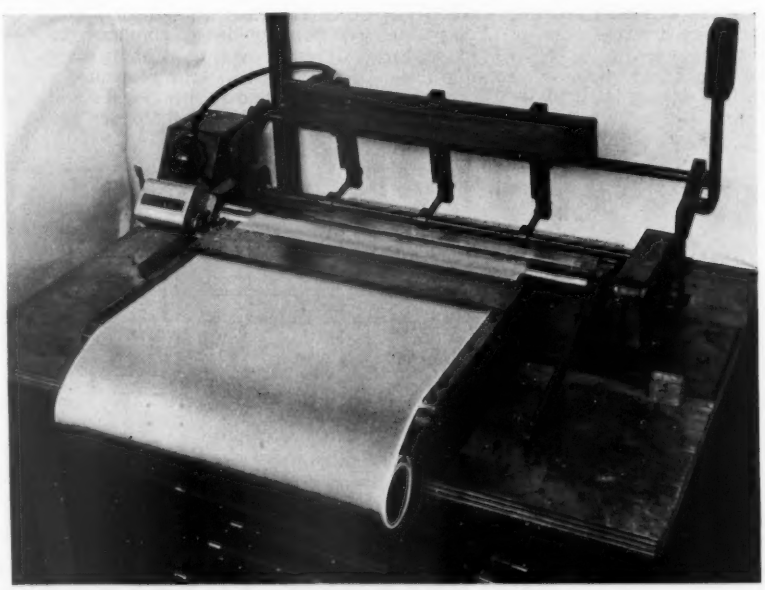
This form of insulation proved satisfactory both in mechanical strength and insulating properties, but difficulties in handling the compound retarded the production rate; it has also been found from experience to be too hard to ensure the contact clamps gripping and remaining tight. These comparatively unsuccessful stages in the development were therefore followed by further experiments using insulation in the form of a glass cloth wrapper impregnated with an epoxy resin which acts as an adhesive under heat and pressure. The glass cloth was obtained in roll form to suit the full width of the shaft, and the 13 turns required to give the desired insulation thickness were wrapped by hand on the trial shafts.

Special Fixture

After successful tests it was then necessary to evolve a method of speeding up the process, and a fixture was manufactured for the purpose. The glass cloth was fed under tension on to the shaft which is rotated by a hand-operated ratchet device.

As the shaft rotates the heat and pressure required to activate the adhesive is applied by a hand-operated electrically-heated press head. When the desired number of turns are indicated on the counter attachment the glass cloth is cut and sealed. The insulated shaft is then pressed between angle formers to ensure accurate dimensions, and placed in an oven to cure the epoxy resin. Finally a coating of anti-tracking paint is applied to finish.

This form of insulation has proved successful under severe service conditions, and many hundreds of reverser shafts are now being modified on a programme basis.



Fixture for applying glass cloth insulation, showing heater raised

S.N.C.F. FINANCIAL RESULTS FOR 1957.—The annual accounts of the S.N.C.F. for 1957 show a loss on operating account of 22,000 million francs compared with one of 59,900 million francs for 1956. This improved position was partly due to an increase in traffic receipts of 38,000 million francs, to 525,000 million, against a rise in expenses of only 22,000 million francs. The S.N.C.F. was also helped by legislation removing from the railway the obligation of paying to the State a tax on receipts in return for upkeep of the permanent way, a saving of 17,000 million francs; also, independent of the operating account, the obligation in respect of the "T.P.S." tax on freight was 20,000 million francs lower than in the previous year. The railways, however, continue to receive from the State payments in respect of charges not increased, or reduced, at the request of the Government, and compensation for certain pension payments.

Washing Plant for S.A.R. Reef Electric Stock

Slow propulsion by winch to ensure pre-determined interval between preliminary and final cleaning

Interior of central control tower, showing view over sidings

THE mechanical washing plant at Braamfontein carriage sidings, near Johannesburg, South African Railways, was designed to clean the exterior sides of the Reef electric suburban stock built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. and the Birmingham Carriage & Wagon Co. Ltd.

This stock is formed in sets of 8-12 coaches. It is proposed to wash all the Reef suburban stock, approximately 750 coaches, made up into approximately 80 sets, at regular intervals not exceeding three or four days, *i.e.* twice a week. The plant has also been designed to be capable of washing main-line saloons should it be desired at any time to wash coaches such as those of the "Blue Train." It is intended to install another plant later on for the regular washing of main-line saloons. Brief reference to the Braamfontein plant was made in our June 27 and July 4 issues.

Washing at Braamfontein hitherto has been by bucket and broom, requiring a large labour force. It is expected that the new plant will bring about a much more satisfactory standard of exterior appearance. Coach ends, however, still have to be manually cleaned. Coach roofs are not washed because of the pantograph current collectors and other electrical equipment. An effort has been made to combine the best features of overseas washing plants and design to suit the coaching stock concerned and to meet local conditions.

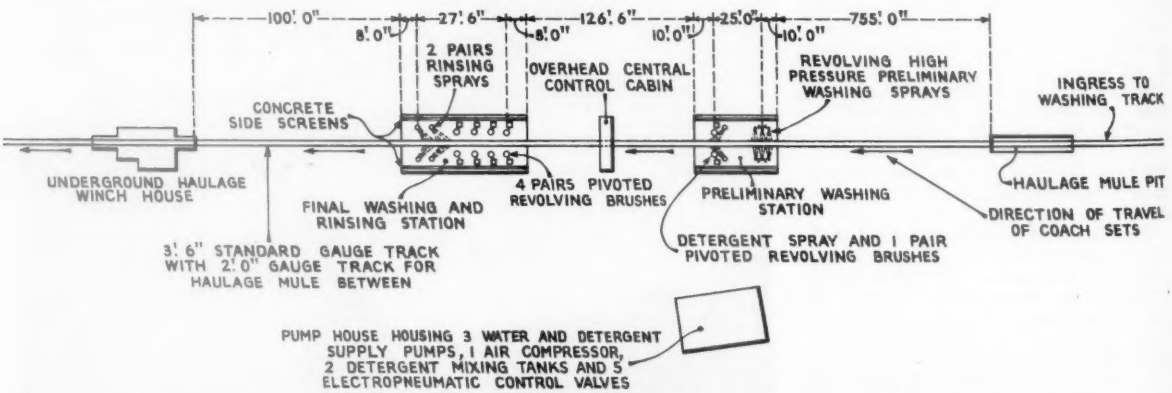
The plant wash three sets of 8-12 coaches an hr. whereas a manual labour force of some 20 men and a supervisor would take about 6 hr. for the same job.

The final costs of this plant have not yet been determined but will total approximately £43,000 as follows: Emanuel washing plant, £12,000; haulage winch £7,000; civil engineering works (foundations, drainage slabs and side screens for the two washing stations, water and detergent reticulation, drainage, pump house, winch house, mule pit, trackwork, and overhead control cabin), £17,000; electrical installation, £5,000; mechanical installation, £2,000.

Cost of Operation

Actual operating costs cannot be determined until sufficient operating experience has been gained, but it is estimated that the cost of mechanical washing will be between one-half and one-third that of manual washing, including charges for interest on capital, depreciation and maintenance, that is approximately 6s. a wash for each coach, compared with approximately 17s. for manual washing.

The sets of coaches are brought up to the entrance to the installation under their own power, during slack traffic periods in mid-morning, early afternoon, and late evening and night. When in position at the entrance to the washing plant, the coach set is drawn through the washing plant by an endless rope winch and haulage mule. The latter is attached to the wire rope running between the tracks and pushes the set through the plant at a low even speed of approximately ¼ m.p.h. This slow, even speed is considered essential for a good wash, particularly on the older coaching stock on which there are many protrusions such as handles and deeply recessed windows. The electric sets cannot be self-propelled at


100' 0"
8' 0"
27' 6"
8' 0"
126' 6"
10' 0"
25' 0"
10' 0"
755' 0"
2 PAIRS RINSING SPRAYS
OVERHEAD CENTRAL CONTROL CABIN
REVOLVING HIGH PRESSURE PRELIMINARY WASHING SPRAYS
INGRESS TO WASHING TRACK
CONCRETE SIDE SCREENS
UNDERGROUND HAULAGE WINCH HOUSE
FINAL WASHING AND RINSING STATION
4 PAIRS PIVOTED REVOLVING BRUSHES
PRELIMINARY WASHING STATION
HAULAGE MULE PIT
DIRECTION OF TRAVEL OF COACH SETS
3' 6" STANDARD GAUGE TRACK WITH 2' 0" GAUGE TRACK FOR HAULAGE MULE BETWEEN
DETERGENT SPRAY AND 1 PAIR PIVOTED REVOLVING BRUSHES
PUMP HOUSE HOUSING 3 WATER AND DETERGENT SUPPLY PUMPS, 1 AIR COMPRESSOR, 2 DETERGENT MIXING TANKS AND 5 ELECTROPNEUMATIC CONTROL VALVES

Sequence of operations: the distance between preliminary and final cleaning is related to the speed of propulsion of coaches, to give an elapse of 2 min., so as to allow detergent to loosen dirt

Preliminary washing station from control tower : the single pair of revolving brushes and detergent sprays in action ; behind them (not visible) are the revolving high-pressure water sprays

this slow speed, and winch haulage was selected in preference to a diesel shunting engine, as there is a considerable saving in first cost and operating costs.

Haulage Equipment

The haulage equipment comprises a specially designed two-speed winch: 76 ft. a min. forward for hauling the coach sets and 500 ft. a min. in reverse for returning the " mule " to its pit under the track. This is located in an underground winch house beneath the washing track, and has a single endless steel wire rope of ¼ in. dia. driven by the 5-ft. dia. fleeting (driving) wheel of the winch.

The haulage rope ends are attached to a mule running on a narrow-gauge track between the standard-gauge rails, which pushes against the back coupler of the train set, through the two washing stations in turn. When the set has passed through the washing plant it moves off to the staging yards or electric running sheds under its own power, and the winch is reversed to return the mule to its underground pit between the tracks at the entrance to the washing track. The mule must be back in position in its pit before the next set is brought in for washing.

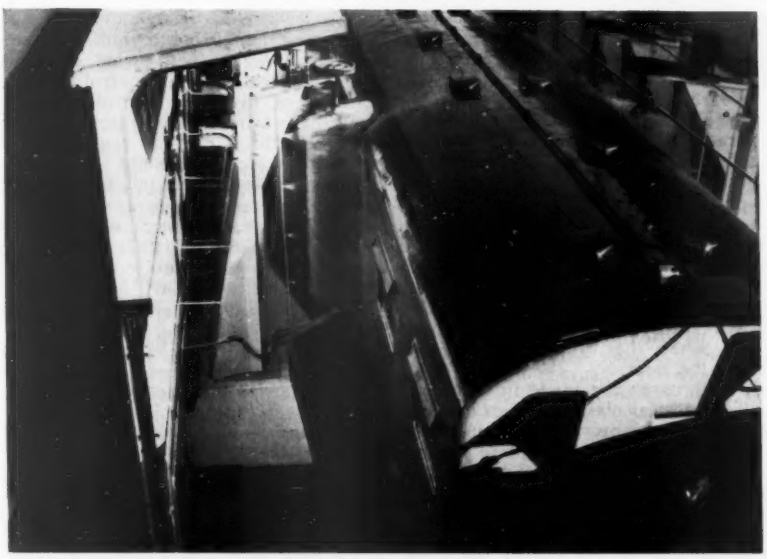
The forward drive of the winch at 76 ft. a min. is from a 35-h.p. S.C. motor coupled through a Vulcan-Sinclair fluid coupling and centrifugal clutch to the 1st motion shaft extension of the winch gearbox. The reverse drive of the winch at 500 ft. a min. is obtained by switching off the motor. This applies the electro-mechanical winch brake, and through a time-delay relay switching on a 20-h.p. S.C. motor also coupled through a Vulcan-Sinclair coupling to the second motion shaft of the winch gearbox, drives the fleeting wheel in reverse through the remainder of the gearbox at the higher speed. By this arrangement the use of change speed gears and solenoid-operated clutches is avoided. Both ends of the haulage are equipped with limit switches to prevent over-running of the mule. This haulage is equipped with a weight loaded tensioning arrangement for the rope is 2,500 ft. long. The winch house is located underground immediately beneath the washing track, to allow the sets to run over the winch house after being washed, on to the staging roads.

The coach washing plant proper comprises: (*a*) a preliminary washing station or zone where the coach sides are thoroughly wetted, the loose dust washed off, and detergent solution applied if required; (*b*) a final washing station where the sides are thoroughly washed and scrubbed and finally rinsed; (*c*) an elevated control cabin housing all the electric and hydraulic operating controls for both the haulage winch and the washing plant; (*d*) a brick pump house located to one side, housing the two water supply pumps, the detergent supply pump, a small air compressor, the five electro-pneumatic water and detergent supply control valves, and two 600-gal. detergent mixing tanks with space for storage of spares and detergent supplies; and (*e*) a pair of concrete screens on either side of the track at both washing stations and a drainage slab to confine the washing water and detergent to the washing area.

Preliminary Washing Station

One pair of high pressure revolving pre-washing sprays at the preliminary washing station is fed by a centrifugal pump with a capacity of 33 gal. per min. at 285 lb. per sq. in., of which the purpose is to wet and cool the coach sides so as to delay evaporation of the detergent subsequently applied, and to wash off the loose dirt and mud from both sides and roof eaves. The special feature of these sprays is that they are mounted four sprays on each of three arms attached to a central rotor, so that the arms rotate at 120/150 r.p.m. because of the reaction of the jets of water, which are adjusted so as to impinge hard against the sides of the coaches at the most effective washing angle.

About 25 ft. farther on from the preliminary washing sprays detergent solution is applied by sprays fed from the detergent mixing tanks in the pump house, by a centrifugal pump of capacity 5 gal. per min. These project a fine spray of detergent on to the first



Final washing and rinsing station, showing two of the four pairs of pivoted revolving brushes

pair of pivoted revolving cylindrical nylon bristle brushes, which scrub the detergent on to the coach sides from top to bottom.

A distance of 140 ft. has been allowed between the preliminary washing station and the final washing station to allow an elapse of 2 min. for the detergent solution applied at the preliminary washing station to loosen the dirt. It would have been advantageous to allow twice this distance and time, but the length of track available for the washing plant was restricted by site conditions, and the speed of transit could not be made slower, bearing in mind the number of coaches.

Final Washing Station

One eight-brush unit at the final washing station consists of four pairs of pivoted revolving cylindrical nylon bristle brushes; the first and last pair are about 7ft. 3 in. long and 2 ft. 1½ in. dia. over bristles, with a top section 2 ft. 9½ in. dia. to wash the roof eaves; the two central pairs are about 6 ft. 4 in. and 2 ft. 9½ in. dia. The first pair of brushes revolves in the opposite direction to the succeeding pairs of brushes, so as to clean recessed windows and doors more thoroughly.

The purpose of all these brushes is to scrub sides and roof eaves so as to remove all the dirt with the detergent and clean the outside of the windows. Eight sets of special fan spray jets are provided for the continuous rinsing of the brushes during the coach washing. The two central pairs of brushes have been made of larger dia. than the two outer pairs of brushes, to improve the scrubbing and washing action on the older stock with its recessed windows and so on, and to clean the vestibule entrances of main-line coaching stock, should it be desired to also clean this type of stock in this plant.

All the brushes are individually driven, each by a 3-h.p. motor through a vee-belt driven and overhead slipping clutch at approximately 240 r.p.m. The brushes are applied to the coach sides by spring pressure which is adjustable, and are controlled and retracted by hydraulic thrusting and locking devices operated from the central control cabin. The hydraulic pressure for operating the brush control cylinders is obtained from the same supply pump as the rinsing jets at a pressure of 85-100 lb. per sq. in. The brush arms are pivoted to upright frames to allow the brushes to swing into or away from the coach sides. Only the nylon bristles, which spread out due to centrifugal force when the brushes are rotated, brush the sides.

The brushes are made up of 16/18 half-cylindrical plastic sections approximately 9 in. long. Every half-section is united to its corresponding section, and to the other brush sections, by light-alloy spacers all mounted on a tubular vertical shaft and maintained in position by a large helical spring and adjusting nut at the top of the shaft. This facilitates dismantling and replacement of the brush sections.

The special nylon bristles are 0·35 mm. dia. and are secured to the plastic half-cylindrical holders by stainless steel wire. Nylon bristles have been adopted because, though much more expensive than natural or vegetable fibres, they have the following advantages:—(*i*) they can be as long as required, so allowing a large enough outside dia. of the brush element to accommodate protrusions, which is important for older types of S.A.R. stock; (*ii*) they are much more resistant to wear; (*iii*) they afford a more elastic and softer scrubbing action.

One final rinsing unit is provided in the final washing station immediately after the eight-brush unit. This consists of two pairs of vertical pipes each equipped with fan spray rinsing jets to wash off remaining detergent and dirt.

Ancillary washing plant equipment provided includes one high pressure water pump of capacity 33 gal. per minute at 285 lb. per lb. in. to supply the preliminary washing sprays; and one slow presure pump of capacity 130 gal. at 85-100 per sq. in. to supply the rinsing water for the revolving brushes and for the final rinsing sprays and to provide hydraulic pressure for the brush operating controls. A small air compressor supplies air for operating the five electro-pneumatic control valves that control the water and detergent supply, two 600-gal. detergent mixing tanks equipped with motor-driven stirrers, and a detergent supply pump of capacity 5 gal. a min. The water supply and detergent supply reticulation and drainage arrangements were provided by the South African Railways.

Controls

The whole washing plant and winch haulage is controlled by one operator in an overhead control cabin which straddles the washing track between the two washing stations, giving the operator a clear view of operation at both stations. The cabin is built of reinforced concrete with wide windows front and rear. At the control desk are one set of hydraulic controls for putting the brushes into operating position and retracting them as required; and one set of electrical controls for starting and stopping the three centrifugal pumps, the air compressor, the five electro-pneumatic water and detergent control valves, the 10 brush-driving motors, and the haulage winch stop, start, reverse, and winch brake release. Gauges indicate water, detergent and compressed air pressures.

Particular attention is being given to testing various detergents. The requirements are: (*a*) the detergent must be effective in loosening the tenacious ferrous grime in the very short time of 2 min. which elapses between the two washing stations; (*b*) it must not damage the paint on the coaches or the brushes of the washing plant or promote corrosion on steel coaches; (*c*) it must be effective with cold water, be easily mixed, and be stable; (*d*) it must be economical. One or two of the detergents now being tested give promise of meeting these requirements.

The mechanical washing portion of the plant was manufactured by Emanuel, of Turin. The haulage winch and equipment were supplied by Koppel Engineering Co. Ltd., of Johannesburg. The civil engineering works and mechanical and electrical installation were carried out by the S.A.R.

Fully-Sprung Motors

(*Concluded from page* 248)

support between the bracket *10* and the gear housing at *2* is inclined at an angle of 17 degs., the action of the primary suspension will cause a greater vertical displacement of the motor than of the gear housing which will be also subjected to an angular displacement.

The links *14* are provided as a safety measure, being secured on cast pegs *16* at the upper end whilst the bolts *15* project into grooves in the link *1*. Whilst with this drive the motor is fully sprung borne, it is not fully protected against high rotational acceleration, this requiring a certain torsional elasticity, which might be desirable with heavier and more powerful motors.

The desire to improve the riding qualities of railcars by using fully-sprung motors with relatively simple and robust drives has become evident on the Continent where this practice has extended from locomotives and main-line electric railcars to suburban vehicles and tramcars, notably in Switzerland, Italy, Germany and Sweden, leading to the development of specialised drives aming at simplicity, reduced weight and low maintenance expenses[3].

Even in Germany where axle-hung motors were mainly used with heavy and fast multiple-unit sets, tests are now in hand with fully-sprung motors incorporating quill drives with rubber segments[4] as well as with resilient wheels as a possible alternative. As the motors are identical to axle-hung units the comparative maintenance costs should provide some clarity at least as far as the motors are concerned. If this trend is pursued to its logical conclusion then similar considerations should also apply to the axledrives of diesel-hydraulic and diesel-mechanical railcars; that some administrations are prepared to follow this line is shown by the design of the Italian "Trans Europe Express" sets[5] employing a quill drive with rubber pads between the bevel axledrive and the wheels.

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[4] "Jahrbuch des Eisenbahnwesens," Vol. 8, 1957, pp. 101-102, Carl Röhrig Verlag, Darmstadt.
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RAILWAY NEWS SECTION

PERSONAL

Mr. J. Taylor Thompson, Chief Civil Engineer, British Railways, London Midland Region, is retiring on December 31. He will be succeeded by Mr. A. N. Butland who is at present Assistant Civil Engineer.

Mr. B. Arora, B.Sc., former General Manager of the North Eastern Railway of India, who, as recently recorded, becomes General Manager of the Central Railway, was born in 1904, and educated at Kanpur and Allahabad. He joined the Eastern Bengal Railway in 1927 as an Assistant Traffic Superintendent. He became a District Traffic Superintendent in 1933 and, subsequently, Statistical Officer, Eastern Bengal Railway. In 1942, Mr. Arora was appointed Deputy Director, Statistics, Railway Board, New Delhi and, later, Officer on Special Duty (Post-War Reconstruction), with the rank of Joint Director. In 1946 he returned to the Bengal Assam Railway as Deputy Chief Commercial Manager, and, was subsequently promoted to be Deputy General Manager (Personnel). On the eve of partition in July, 1947, Mr. Arora was appointed Transfer Officer (India) at Calcutta. In this capacity he was responsible for the absorption into the railways of Eastern Pakistan of about 22,000 India-opting employees. This work had to be completed in about six months and, on its termination he was transferred to the Railway Board as Director of Traffic. In June, 1948, he was appointed Chief Administrative Officer, Assam Railway and, in April, 1952, Senior Deputy General Manager of the then newly-formed North Eastern Railway. Mr. Arora was appointed General Manager of that system in April, 1954, the position he now vacates to take up his new appointment in Bombay.

Mr. B. Arora
Appointed General Manager, Central Railway, India

Mr. S. S. Ramasubban
Appointed General Manager, North Eastern Railway of India

Mr. J. F. Harrison, Chief Mechanical & Electrical Engineer of the London Midland Region of British Railways, has been appointed to the new position of Chief Mechanical Engineer, British Railways Central Staff, British Transport Commission. This appointment has been made as a consequence of an amalgamation of the Commission's present Mechanical and Carriage & Wagon Engineering Departments (editorial note this week refers). Mr. Harrison will be succeeded as Chief Mechanical & Electrical Engineer in the London Midland Region by Mr. A. E. Robson, at present Chief Carriage & Wagon Engineering Officer, British Railways Central Staff. These changes will take effect from October 1, 1958.

Mr. S. S. Ramasubban who, as recorded in our June 6 issue, has been appointed General Manager, North Eastern Railway of India, was born in 1907. In 1927, he graduated B.A. from the Presidency College, Madras, with Honours in Physics He spent two years as a research student in physics at Calcutta. Mr. Ramasubban joined the former Great Indian Peninsula Railway in 1930. He served at the head office in Bombay and in the districts both in Junior and Senior scales. He became Divisional Traffic Manager at Nagpur from 1941 to 1946. He was responsible for getting up the coal allotment system to deal with distribution of coal wagons from Pench Valley and Chanda Valley coalfields. He was also closely concerned with the organisation of the road transport corporations at Nagpur. In 1946, he became Joint Director, Rail-Road, for the Railway Board and took part in the reorganisation of road transport in Uttar Pradesh. Mr. Ramasubban was appointed Secretary, Railway Board, in September, 1947. In this capacity he dealt with many major problems connected with partition, including absorption of thousands of railwaymen from Western Pakistan. He was also in office during the reorganisation of the railways into larger zones. In 1951, on completion of his tenure of office, Mr. Ramasubban returned to the Central Railway as Divisional Superintendent, Jhansi. He was appointed Senior Deputy Manager of that system in May, 1953. Two months later he was transferred to the Western Railway as Senior Deputy General Manager and was associated with the organisational changes of that railway. He also played a leading part in the change-over from district to divisional system of

organisation and in the working of the Second Five-Year Plan. Mr. Ramasubban took up his present appointment in March this year.

Mr. I. S. Johnston, who, as recorded in our July 11 issue, has retired as Comptroller of Stores, began his railway career in 1918 as a cadet at North Otago station at Hampden. Mr. Johnston entered the Stores Branch the following year, and, by 1939, had become Senior Clerk in the Stores Shipper's office at Wellington. In 1940 he enlisted with the Railway Operating Company and was posted to the Middle East. On his return to New Zealand, he served on the Government Stores Control Board before resuming duty with the Railways Department. He was appointed Senior Clerk in the Comptroller of Stores' Wellington office in 1949, and Stores Inspector in the North Island in 1951. Mr. Johnston was appointed Comptroller of Stores in August, 1953, and was responsible for arranging the purchase, control, and distribution of railway stores, fuel and equipment to a total value of some £13,000,000 each year.

Mr. I. S. Johnston

Comptroller of Stores, New Zealand Government Railways, 1953-58

Mr. J. A. O'Callaghan

Who has been appointed Comptroller of Stores, New Zealand Government Railways

Mr. W. Urquhart, Deputy General Manager, East African Railways & Harbours, has assumed the duties of Acting General Manager in the absence of the General Manager, Mr. J. R. Farquharson. Mr. Farquharson intends to have six weeks' leave in the United Kingdom, and will then be attending the seventeenth session of the International Railway Congress Association in Madrid from September 29 to October 7. He plans to return to East Africa about October 15.

Mr. J. A. O'Callaghan, who, as recorded in our July 11 issue, has been appointed Comptroller of Stores, New Zealand Government Railways, began his railway career in 1921 as a cadet, at New Plymouth. Mr. O'Callaghan was posted to the Stores Branch at Petone 18 months later. In 1938, he entered the Comptroller of Stores' office in Wellington, where he served in various positions for 14 years, except for military service between 1942 and 1945. He subsequently moved to the District Stores Managers' office at Woburn, and later became Stores Inspector, North Island. In 1955, Mr. O'Callaghan was appointed Assistant Comptroller of Stores.

London Midland Region, British Railways, announces that the following have been appointed Public Relations Officers to the newly-appointed Divisional Traffic Managers:—

Mr. T. Clark, Divisional Traffic Manager's Office, Barrow.

Mr. C. Norton-Smith, Divisional Traffic Manager's Office, Liverpool.

Mr. R. J. E. Owen, Divisional Traffic Manager's Office, Nottingham.

Mr. R. H. Thomas, Divisional Traffic Manager's Office, Manchester.

Mr. G. H. Murrell, Divisional Traffic Manager's Office, London.

Mr. R. W. Crawshaw, Public Relations & Publicity Officer, London Midland Region, whose Headquarters are at Euston, will continue to have the overall responsibility for public relations policy as well as for publicity and Press advertising.

Mr. E. S. Ely, M.I.Mech.E., M.I.E.E., Docks Mechanical and Electrical Engineer, Southampton Docks, British Transport Docks, is retiring. Mr. E. S. Ely commenced his career at Southampton with the London & South Western Railway Company. He served in the forces during the 1914-18 war and later obtained experience with various engineering firms. He returned to Southampton Docks in 1928 as an engineering draughtsman in the Engineer's Department. He was appointed Assistant Electrical Engineer, Southampton Docks, in 1940 and became Electrical Engineer in 1943. Mr. Ely was promoted to be Docks Mechanical & Electrical Engineer, Southampton Docks, British Transport Commission, in 1951.

British Transport Docks announces that, as a result of reorganisation, Mr. J. H. Jellett, O.B.E., M.I.C.E., Docks Engineer, Southampton Docks, has been appointed Chief Docks Engineer. Mr. Jellett was educated at Shrewsbury and Cambridge. Following a pupilage with Messrs. Rendel, Palmer & Tritton, he was retained by that firm as an Assistant Engineer. He was subsequently appointed Assistant Resident Engineer on the reconstruction of the Warwickshire section of the Grand Union Canal. In 1933 he joined the staff of the Civil Engineer-in-Chief to the Admiralty;

Mr. R. A. Long

Appointed Economic Survey Officer, Eastern Region

Mr. F. L. Burton

Appointed General Agent, Passenger Department, London, C.P.R.

Mr. H. K. Williams

Appointed Assistant General Agent, Passenger Department, C.P.R.

after serving as Assistant Civil Engineer and, later, as Civil Engineer, he became Superintending Civil Engineer responsible for carrying out work in the Mediterranean and the Near East. For six months he was the Civil Engineer-in-Chief's representative on the construction of the "Mulberry" harbour at Arromanches, with the rank of Captain R.N.V.R. In 1946 he was appointed Deputy Docks Engineer at Southampton, Southern Railway, and became Docks Engineer in 1948. He was a member of the Council of the Institution of Civil Engineers for five years, and has been re-elected for 1958.

Mr. R. A. Long, Principal Traffic Costing Officer, Liverpool Street, Eastern Region, British Railways, who, as recorded in our July 25 issue, has been appointed Economic Survey Officer, Eastern Region, will take full charge of the Economic Survey Office. Mr. Long joined the former L.N.E.R. at Leeds in 1935. After gaining experience at stations and in district and headquarters commercial offices of the North Eastern Area, he completed the training of a traffic apprentice in the Southern Area. After a period on the relief staff as a stationmaster and on special duties, Mr. Long was appointed Assistant to the Manchester District Superintendent in 1942, and in the following year entered the Rates & Statistics Section of the Chief General Manager's Office. In 1944 Mr. Long became Head Office Inspector to the Superintendent (Southern Area), and Locomotive Running Superintendent (Western Section). In 1947 he occupied the positions of Deputy Chief of the Trains Section and Chief of the Timetable Section in the office of the Passenger Manager (Southern Area). In 1948 he became Chief of the Central Timing & Engine Diagramming Section, Southern Area (Eastern Section), and in the following year was appointed Trains Assistant to the Operating Superintendent (Eastern Section). He became Assistant (Freight Trains) to the Operating Superintendent, Eastern and North Eastern Regions, in 1950. In 1951 he joined the Traffic Costing Service, B.T.C. Headquarters, as a Traffic Costing Officer. Mr. Long was appointed Senior Traffic Costing Officer, Liverpool Street, in 1953 and later redesignated Principal Traffic Costing Officer. In addition, he took administrative charge of the Economic Survey Office, Eastern Region, from its inception in 1957.

Mr. S. Walker, Managing Director of Laycock Engineering Limited has retired, but has been appointed Vice-chairman. He has also been appointed an additional director of the parent company, Birfield, Limited. Mr. W. E. Thompson and Mr. K. Walker have been appointed joint General Managers of Laycock Engineering Limited.

Mr. F. L. Burton, who, as recorded in our July 18 issue, has been appointed General Agent, Passenger Department, London, Canadian Pacific Railway, was born in Ireland. He was educated at St. Louis College, Victoria, British Colombia, and later in England. Mr. Burton joined the C.P.R. in Liverpool in 1924. He was Cruise Director on short Mediterranean cruises between 1932 and 1939, and was made Travelling Passenger Agent in 1938. He was also an assistant cruise director for West Indies, Mediterranean and world cruises of various Canadian Pacific ships. During the war he served in Movement Control, Royal Engineers, and served in North Africa, Italy and Greece, attaining the rank of Lt.-Colonel. He returned to the company's service and became Travelling Freight Agent in 1947, and Freight & Passenger Agent, Manchester, in 1951. He transferred to London in September, 1952, as Assistant General Agent.

Mr. T. G. Eato, Assistant District Commercial Superintendent (General), Hull, Eastern Region, British Railways, has been appointed District Commercial Officer, Ipswich, under the Traffic Manager, Norwich. He succeeds Mr. R. E. Lawler, who has retired.

Mr. W. V. S. Sinclair has been appointed Chairman, Mr. J. L. Burden Managing Director, and Mr. D. A. Cross a Director of the A.B.C. Coupler & Engineering Co. Ltd. The former Chairman, Mr. Gerard Young, and the former Managing Director, Mr. J. B. Curry, are leaving the service of the company and all other directors have resigned. Mr. G. T. Bowerman continues as Secretary. Control of the company has been sold.

Mr. H. K. Williams, who, as recorded in our July 18 issue, has been appointed Assistant General Agent, Passenger Department, London, Canadian Pacific Railway, joined the C.P.R. in 1916 as a junior clerk, Accounts Department, Liverpool, transferring in the following year to the passenger side. Mr. Williams moved to London in 1922, to help in port clearance when the company opened their Southampton service. In 1929 he was transferred to the European Passenger Manager's office, in charge of the Canadian Tours Section, and toured Canada in 1929, 1930 and 1931 in charge of special parties. He served in Movement Control, Royal Engineers, during the war, and returned to the C.P.R. service in August, 1946. Mr. Williams later moved to Manchester as Passenger Clerk, and, in 1949, became City Passenger Agent, Liverpool. He moved to London, in December last, as Chief Clerk, the position he vacates.

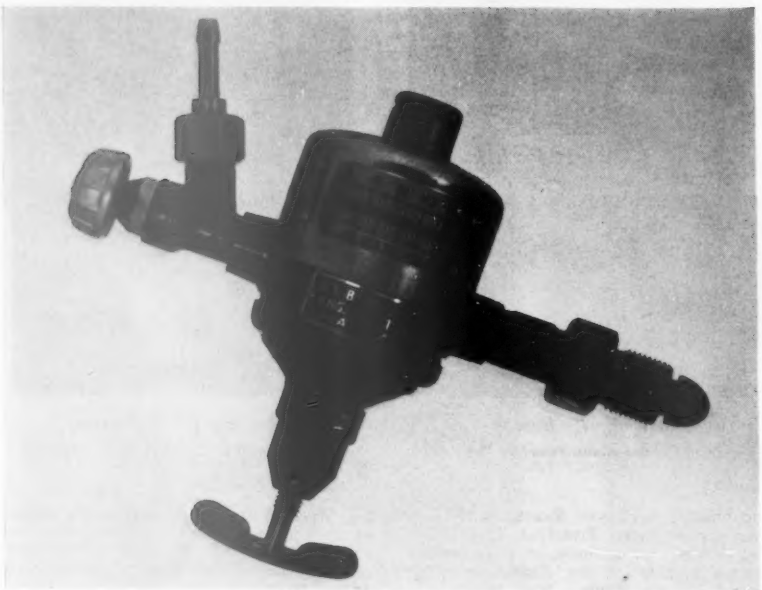
We regret to record the death on August 25, at the age of 75, of Sir Guy Locock, a vice-president of the Federation of British Industries. He was a director of the F.B.I. from 1932 to 1945.

We regret to record the death on August 17, at the age of 76, of Mr. A. S. Rigley, Chairman and Joint Managing Director of William Rigley & Sons Ltd.

Mr. E. G. Dravers, Traffic Manager of East Midland Motor Services Limited, has been appointed to succeed Mr. F. K. Pointon as General Manager of Hebble Motor Services Limited, who as previously recorded is succeeding Mr. S. J. B. Skyrme as General Manager of East Midland Motor Services Limited.

Mr. Robert G. Edwards has been appointed to the board of the Indian Iron & Steel Company in place of Mr. James L. Esplen who has resigned.

NEW EQUIPMENT AND PROCESSES



Oxy-Acetylene Gas Cylinder Regulator

A REGULATOR for all oxy-acetylene welding and cutting purposes has completely built-in pressure and contents gauges, safety valve and a leak-proof diaphragm sealing valve. Known as the Recorde regulator, it is now available in this country.

Because of the robust construction and built-in gauges the product is stated to overcome faults which can occur in normal gauges through cylinders falling or being jarred and so on. It weighs under 4 lb. and is available for use with all kinds of gases. It is also suitable to be used with compressed air.

The accompanying illustration shows the general design. The body is a hot brass stamping and is machined to close limits. The main valve is designed to give a leak-proof joint to eliminate drop or creep of pressure whilst in operation.

Delivery is ex-stock. The price is £8 15s. Further details may be obtained from the manufacturer, D. S. Baddeley Engineering Co. Ltd., 43-45, York Street, Glasgow, C.2.

Phase and Continuity Indicator

A COMPACT indicator provides visual signals by five neon lamps to show the peak voltage sequence in three-phase supply lines and also to identify broken lines.

The whole unit is continuously rated, and three of the lamps are arranged so that if the lines under test are live, all three lamps light up. If one line is dead, the lamp associated with that line lights up whilst the others remain unlit. If all the lines being tested are sound, phase sequence is shown by one or other of the two remaining lamps lighting up. The same lamps are not used for phase and line continuity indication.

The instrument has flying leads terminating in insulated clips or interchangeable test probes, with stowage compartment, and measures 3-in. × 2-in. × 1½-in. and weighs 4 oz. An advantage claimed for the unit is that it has no moving parts and is very robust.

The price of £5 5s. is ex-works. The device caters for three-phase, 115/200-V., 400 cycles, a.c.; a similar version for 400-V., 50/60 cycles also is available.

Full details may be obtained from the manufacturer, Tiltman Langley Limited, Redhill Aerodrome, Surrey.

Metal Cutting Bandsaw Machine

THE Limitax horizontal metal cutting bandsaw machine, designated 09, recently added to the maker's range of bandsawing machines, has a nominal capacity of 10 in. × 15 in. This means that round bars 10 in. dia., squares up to 8 in. × 8 in., and flats or sections 5 in. × 15 in., may be cut. Greater widths can be sawn, depending on thickness.

The machine is robust, and extensive use has been made of fabricated construction. It is mounted on an all-steel fabricated base, which incorporates a coolant tray and suds pump driven by a separate electric motor. Normally the suds pump starts or stops with the main driving motor; but the pump may be put out of use when required by means of a separate push-button switch.

The universal vice is of the same type as those fitted to the Fortuna hack sawing machines. It is arranged to swivel at angles up to 45 deg. for mitre cuts, and so on. The capacity at 45 deg. is 9 in. dia. round bars.

The bandsaw frame is pivoted on a support fixed to the rear end of the bed, and is further strengthened by an auxiliary frame mounted vertically, in the throat of the main frame. This frame carries the bandsaw guide holders, which give the blade a quarter twist, bringing it into the vertical position for cutting. The actual guide rollers are carried on ball bearings, and are adjustable to bring the horizontal rollers close on to the blade. The guide holders are fitted with wipers to remove swarf from the blade.

The saw frame descends under control of a new type of oil dashpot, which is adjustable between wide limits, to vary speed of descent. The saw driving wheel is driven by a 1-b.h.p. electric motor; speeds of 125 or 55 ft. per min. may be obtained. Other speed ranges can be fitted if desired.

Principal particulars are: length of saw blade, 12 ft. × 8 in. × 1 in. wide, floor space, 96 in. × 33 in., height of machine with saw frame raised, 65 in.

Further details may be obtained from the manufacturer, New Fortuna Co. Ltd., Fortuna Works, Southmead, Westbury-on-Trym, Bristol.

Brighter Fluorescent Lamps

A TECHNIQUE of fluorescent lamp production has been developed which results in an increase in the light output from the manufacturer's fluorescent lamps. With the more common ratings, this means an initial increase of between 10 and 15 per cent, which is associated with improved lumen maintenance throughout lamp life.

This change has resulted from improvements in the application of the phosphor coating inside the tube wall. Only the total quantity of light emitted is affected and the colour quality remains unchanged.

The first colour to be made available through this new technique is Cool White (Daylight) and, in the case of the 4-ft., 40-W. rating, the new output is 2,800 lumens. This represents an efficiency of 70 lumens per W. which is stated to be the best figure for a "white" light source. The next colour to be made by the process is the Warm White, and it is intended to extend it to other colours in due course.

The lumen output for the more common ratings of the manufacturer's switch start and instant start lamps are as follow:—80 W., 5 ft., 5,100; 40 W., 4 ft., 2,800; 30 W., 3 ft., 1,980; and 20 W., 2 ft., 1,080.

Further details of the fluorescent lamps may be obtained from the manufacturer, Philips Electrical Limited, Century House, Shaftesbury Avenue, London, W.C.2.

Improved Lining of White Metal Bearings

THE Kolene Process, which uses a combination of electrical, chemical, and physical effects, is stated to give completely reliable preparation of cast iron and other surfaces for lining with white metal. Plant, laid down by the Phosphor Bronze Co. Ltd., incorporates the Kolene method of preparation of bearing backs or halves, with centrifugal lining machines capable of handling bearings up to 20 in. o.d.

For tinning purposes, cast iron is notoriously a "greasy" metal because of the presence of uncombined carbon in the form of graphite dispersed throughout the crystalline structure of the ferrite base; obstacles against forming a chemically clean and continuous surface for tinning are overcome by the process. The workpiece is immersed in a series of baths of which the first contains Kolene 4, a salt of patented formulation. At the temperature maintained in the bath, Kolene 4 has a viscosity lower than water. The workpiece and the heated bath are given opposite charges from a source of direct current, and at first the work is negatively charged to produce reducing members in the bath. Sand is dissolved from castings; scale, rust and other oxides are removed. The low-viscosity molten salt penetrates every small crevice.

After the necessary period the polarity of the workpiece and of the bath are reversed, to promote oxidation. The oxidising removes graphite, grease, and other organic matter. After a further period of reduction to convert oxidation products, thorough rinsing removes all traces of the salt. The work finally emerges dry and chemically clean, ready for metalling.

It is believed that the process is a method of producing completely clean cast iron surfaces with perfect reliability. The company is so confident of the keying effect in cast iron, that it has abolished the machining of reverse-taper keys into the metalled faces of c.i. bearing halves; it advocates plain, unrelieved surfaces to assist even dissipation of heat.

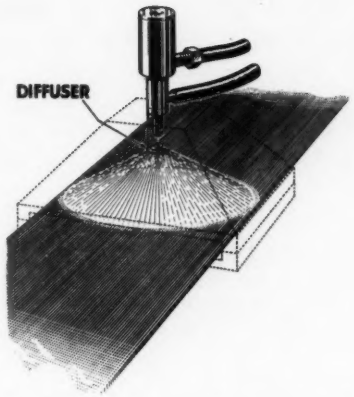
The manufacturer is able to offer bearings of enhanced performance for steel rolling mills, large diesel engines, heavy electrical equipment, and similar applications. The new facilities are equipped to handle bearings up to 6 tons in weight. The accompanying illustration shows a general view of the plant; the tin bath is on the extreme right and white-metal furnaces and centrifugal lining machines are on the left.

Further information may be obtained from the Phosphor Bronze Co. Ltd., Bradford Street, Birmingham, 5.

Automatic Press Lubrication System

TO overcome the problem of the lubrication of material during pressing or drawing operations, the Jaco Series 2 automatic spray gun has been designed. The system can be installed on both sheet-strip and blank-fed presses to provide positive lubrication with automatic control.

The accompanying illustration shows a typical set up for strip lubrication in which the spray is completely shielded. A suitable diffuser can be supplied for any requirement. The spray pattern can be altered to give practically any shape or density required for the operation, the guns being controlled by a simple on/off air valve, which can be operated by cam-solenoid, or by hand. In many cases, the spray can be used to eject the component from the press. Any air pressure from 50-150 lb. per sq in. can be used, no form of pressure regulator being necessary. Care should be taken in the choice of lubricants, as not all oils can be sprayed without a fine vapour being produced.



When using the system in conjunction with a blank loading device, it is advisable to spray the material before entering the press, as it is usually in a more accessible position when on the loader.

The Series 2 guns will operate automatically up to 250 cycles per min., and even for strip feed oiling an intermittent spray operated by the press ram is recommended. For controlled pattern lubrication on large blanks or sheets, a set of guns above and below the sheet can be operated by a single valve on the press. At the same time, individual guns can be brought in and out, by air valves leading from the air main, controlled by the press.

When dealing with the cleaning and lubricating of hot forging dies, the guns may be used on the two-stage principle. By coupling two air lines by a "tee"-piece to the air inlet on the gun, and providing some form of restriction in one of them, by using this line, air only will be emitted from the gun. Then when the lubricant is required, a full flow of air from the unrestricted pipe will operate the gun.

Further details of the Jaco equipment may be obtained from the manufacturer, the Stanley Jevons Tool Company, Avon Street, Birmingham, 11.

Ministry of Transport Accident Report

Hooton South Junction, January 22, 1958:
British Railways, London Midland Region

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport & Civil Aviation, inquired into the accident which occurred at about 1.1 p.m. on January 22, 1958, at Hooton South Junction, on the Chester-Birkenhead line, when the 10.15 a.m. class B passenger train, Wellington to Birkenhead, consisting of four passenger coaches drawn by a class "4" 2-6-4 tank engine left Ledsham station against the down slow starting signal at danger and collided at about 25 m.p.h. with the 10.50 a.m. freight train, Chester to Birkenhead, composed of 30 vehicles and brake van, drawn by a 0-6-0 tank engine, which had just started from the Hooton South Junction home signal. The overtaking engine was derailed and the rear brake van of the freight train destroyed; the next three vehicles were derailed and heavily damaged and other wagons suffered damage. Up and down slow lines were blocked but re-opened at midnight. It was cold with a north-west wind and intermittent snow showers, some heavy.

The relief signalman said he saw the Ledsham signalman waving to him, turned round and noticed the starting signal at danger, but the train had already passed it. It was snowing fairly heavily when the train stopped but by then had eased off; this was confirmed by the signalman in the box who could see another signal 650 yd. away. The porter there said that snow and steam prevented him from seeing the starting signal when he told the guard he could leave. The guard also could not, he said, see the signal; after the train began to move he looked out for a short time but did not see it; snow was blowing on his face and he went inside and shut the window.

The driver of the passenger train had come on duty at 5.45 a.m. after being "on rest" the previous day. He had been on the same engine all the morning and to the freight train driver who began to move it forward. As this was being done it became possible to clear the home signal but the train had not travelled far when the collision occurred.

It happened that the home signal became free to be cleared when the engine of the called forward freight train was passing it, when a loose chain on a wagon caught in and broke its wire; the arm immediately returned to danger and it was calculated that it could only have been 'off" for about 3 sec.

The fireman, who had worked with this driver only once or twice before, saw no signals or the freight train and said the driver made no exclamation before the impact, while the guard who felt no brake application prior to it, thought the speed was the usual 25-30 m.p.h. The freight train driver, who had no difficulty in seeing the starting signal at Ledsham, said there was no snow while he was waiting at the junction.

All Ledsham signals and controls were found to be in order.

distant for the junction when running at about 15 m.p.h., shut the regulator and coasted. His statements about the home signal were confused and contradictory and he seemed to imply he saw its arm come off immediately after he sighted it at danger and then return to that position at once. At the same time he saw a "black object" and was about to brake when the collision occurred. He maintained that it was still snowing, so that he could not see the home signal as early as usual. Also he failed to see the freight train sooner because of the snow.

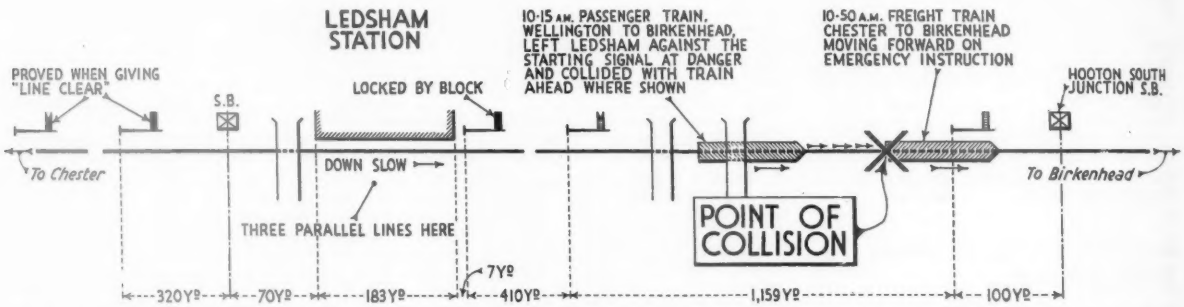


Diagram showing circumstances of accident at Hooton South Junction, British Railways, London Midland Region, January 22, 1958

The accompanying diagram shows the line signals, etc., essential to an understanding of the case; the lines parallel to the down slow are omitted, not being involved in the circumstances producing the accident.

Course of Events and Evidence

The freight train arrived at Hooton South Junction home signal, which could not be cleared because of weather trouble with some points, at 12.50. The passenger train stopped at Ledsham at 12.57, with the starting signal at danger. The signalman there said that he kept the home signal correctly against the train until it had nearly stopped; this was corroborated by its guard who felt the brake application and booked the check in his journal.

The signalman noted that his repeater showed the starting signal to be "on." The block indicator for the down slow line was at "train on line" as "out of section" had not been received for the freight train. After a short interval he saw the passenger train moving away and sent "train running away" to Hooton South Junction; he shouted and gesticulated to a relief signalman whom he saw on the platform, the only person to alight from the train, but to no effect.

At Hooton South Junction the signalman acted promptly on receipt of the emergency bell signal and got a message said it was in good order except for some steam leaks at the front end. He took over the train at Chester; it was his last trip but he was in no particular hurry to get home. He had no difficulty in observing all signals and saw the Ledsham distant at caution and home at danger; the latter came off when he was three or four train lengths away and it was unnecessary to brake until entering the platform. At first he said he took the starting signal to be off for him; it was snowing and the signal was all white and appeared to be off. He repeated that it was "snowing very thickly." He stopped three or four engine lengths from the signal. Questioned further he was insistent that he had seen the signal but was uncertain whether it was "on" or "off"; he added "that was where I made my error; there is no one else to blame."

While looking back along the train he saw the guard's hand signal, opened the regulator and continued to look back; he thought he must have turned his head at the moment the cab was passing the signal and thus he failed to see it. He admitted he "made an error at that particular spot and that's the honest truth." Only the fireman and he were on the engine and they were not talking; nor was there anyone on the platform to whom he was speaking or in whom he was interested, which evidence confirmed. He saw the

Conclusions

The accident was the direct result of failure to observe the Ledsham starting signal. By all accounts snowfall was heavy when the train approached but Colonel McMullen does not believe it was so heavy as to prevent seeing the signal on entering the platform or when stopped 80 yd. from it. If its arm was covered by snow, as the driver stated, and less visible against a background of it, the driver should have taken all the more care to observe it, but it is doubted whether those conditions obtained as the wind was blowing on the back of the arm and the snow was dry. The driver admitted to looking along the train and not at the signal before opening the regulator; nor did he look at it during the 20 sec. or so taken to reach it. It is, however, difficult to see how he failed to observe the arm as he turned his head forward when passing it, no more than 3 yd. away at eye level.

Guards are not required to observe that

signals are clear before giving the "ready to start," but do have to "keep a good look-out when leaving stations." The check at the home signal was an indication that the starting signal was at danger and had the guard complied with the rule he could have seen the signal and stopped the train.

Colonel McMullen thinks the speed reached 25 to 30 m.p.h., when the driver allowed the train to coast, and sure it was not snowing when it approached the junction. Clearly he did not brake at once where it is assumed he saw the home signal, and had no reason to, as stopping distance was more than sufficient. He must have travelled the greater part of it without noticing the freight train, then about 260 yd. ahead, when he saw the signal come off and return to danger almost at once. It is considered that this happened when he was about to brake in the usual way and that the engine struck the train ahead about that time. Adjacent sidings were full and this, coupled with curvature, did not make it easy to see the obstruction, but had the driver been looking out carefully he could certainly have done so in time to reduce speed considerably, if not to avoid the collision.

His failure to observe the starting signal suggested something might have distracted his attention or that he was pre-occupied with other matters, but no such evidence could be elicited from him. It is all the more difficult to understand because he should have expected, and in fact said he did, to find the signal at danger. His failure can be attributed to nothing but negligence; he should also have seen the freight train sooner.

Alternative Services for M. & G.N. Line Area

Brief reference to the alternative services to be provided on eventual closing of the Midland & Great Northern Line of the Eastern Region was made in our August 22 issue.

The Eastern Area Board of the B.T.C. has pointed out in a statement that proposals for closing the M.G.N. section have now been developed in greater detail and will be submitted to the Transport Users' Consultative Committees concerned on September 15. In particular, there have been full discussions about the provision of alternative services.

The board states that agreement has been reached with the Eastern Counties Omnibus Co. Ltd., subject to the approval of the Traffic Commissioners. Under this agreement further bus services will operate between Peterborough, Wisbech, Kings Lynn, Melton Constable, Yarmouth, and Norwich, and these will provide over 500,000 additional bus miles a year. In addition, the Lincolnshire Road Car Co. Ltd. has agreed to operate extra bus services between Spalding and Saxby These arrangements will ensure the continuation of a public service in areas where the train services are being withdrawn.

Goods Services

The freight requirements of the area have been fully considered. In the first place, it is proposed that the following spurs shall remain open for freight traffic, but with reduced status, and with the closing of certain intermediate stations:—(1) Spalding to Sutton Bridge; (2) Peterborough to Wisbech North; (3) Kings Lynn to South Lynn and South Lynn to Gayton Road; (4) Melton Constable to Norwich City.

The future of the section from Melton Constable to Norwich City will be kept under review until alternative plans for the handling of freight traffic elsewhere in Norwich are developed. In the second place, the Traffic Managers are negotiating with traders and offering them alternative methods of transport for their particular traffics.

Special arrangements are also being made for conveying parcels traffic either by road or by rail.

Luncheon to Western Region Mayors

Mr. K. W. C. Grand, General Manager, Western Region, British Railways, was host at a luncheon given on August 19, at Paddington, to members of the active and retired staff of the Region who have been elected to civic office for the year 1958-59. Also present were Regional Officers.

The luncheon was attended by a Lord Mayor, seven Mayors, a City High Sheriff, and a Sheriff, namely, Messrs. A. J. Williams, formerly passenger guard, Lord Mayor of Cardiff; C. S. Thomas, goods guard, Mayor of Welshpool; A. L. Evans, relief signalman (Fowey); G. R. Perrow, clerk (Totnes); E. Edwards, retired ganger (Rhondda); E. J. Broughton, driver (Stourbridge); F. S. Evans, driver (Neath); H. L. Jones, driver (Brecon); E. J. Langdon, driver, City High Sheriff of Gloucester; and I. M. Morris, driver, Sherriff of Carmarthen.

Mr. Williams is the third member of the Western Region to be appointed Lord Mayor of Cardiff; his predecessors held that office in 1928 and 1934. Since 1928 179 Lord Mayors, Mayors and Sheriffs have been elected from the staff of the G.W.R. and the Western Region to office at 65 different places, sometimes for more than one term. The accompanying illustration shows:—

Back row (left to right): Messrs. C. W. Powell, Operating Officer; E. Flaxman, Commercial Officer; W. R. Stevens, Divisional Traffic Manager, Cardiff; M. G. R. Smith, Chief Civil Engineer; I. M. Morris; A. C. B. Pickford, Assistant General Manager (Traffic); C. S. Thomas; H. G. Bowles, Assistant General Manager (Administration); C. J. Rider, Public Relations & Publicity Officer; and H. E. A. White, Running and Maintenance Officer;

Front row (left to right): Messrs. H. L. Jones; E. J. Langdon; G. R. Perrow; A. J. Williams; K. W. C. Grand; F. S. Evans; E. J. Broughton; A. L. Evans; and E. Edwards.

Staff and Labour Matters

Independent Rail Pay Inquiry

Sir John Benstead, C.B.E., Deputy Chairman, British Transport Commission, accompanied by Mr. J. W. Watkins, Member, Mr. A. R. Dunbar, Manpower Adviser, and other representatives of the Commission, on August 25, met representatives of the National Union of Railwaymen, the Associated Society of Locomotive Engineers & Firemen, and the Transport Salaried Staffs' Association for a preliminary discussion on setting up an inquiry into railway pay.

There was general agreement that the inquiry should be conducted by an independent body, and a sub-committee was formed comprising representatives of the Commission and of the three railway unions to agree the detailed arrangements.

Sir Brian Robertson, Chairman of the British Transport Commission, promised to discuss the setting up of such an inquiry in May, at the time of the wage settlement, having regard to the view expressed in the report of the Railway Staff National Tribunal on the "relativity" of railway wages and salaries. The Tribunal said the evidence before them showed that basic rates were low in comparison with those cited as applying in other nationalised industries, and private undertakings.

Dock Employers Make Wage Proposals

Representatives of dock employers and unions discussed on August 25 the report of the Cameron court of inquiry into their wage dispute. The employers made proposals, which are being put to a national delegate conference of dock workers.

Busmen's "Work to Rule" Campaign

Leaders of London busmen decided on August 26 on a new "work to rule" campaign in protest against the 9 per cent economy cuts in L.T.E. services. The plan, which contains seven proposals for non-co-operative measures against the Executive, has yet to be approved by the executive of the T.G.W.U.

Mr. K. W. C. Grand with officers of the Western Region and past and present members of the Regional staff who are holders of civic office

Automatic Train Announcements at Gatwick Airport Station

Recorded announcements in English and French

The sound equipment installation in the recently-opened Gatwick Airport Station, in the Southern Region of British Railways, includes an automatic announcer for broadcasting train information in English and French. Announcements are recorded on a continuous loop of magnetic tape, and are selected and broadcast by the operation of push-buttons on a remote control box at the station foreman's office on Platforms 1-2, the announcer itself being installed in the relay room adjacent to the signalbox on platforms 3-4.

The equipment is mounted on three panels accommodated on a heavy-duty P.O. type rack frame, comprising the announcer unit, power unit, and pre-amplifier and monitor amplifier unit. In the announcer unit a 3½-in. wide magnetic tape is driven past a play-back head which can be positioned over any track of up to 25 recorded announcements by operation of the appropriate push-button. At the completion of an announcement the mechanism is switched off automatically and prepares itself for the next operation. No rewinding is required, the tape being in a continuous loop, and a special form of guide in the tape casket dispenses with the need for spools by causing the tape to lie in a series of loops one above the other. Maximum duration of announcements at Gatwick is 55 sec.

For the Gatwick installation 17 announcements have been recorded at present, 10 of which, relating to principal trains to London and the coast, are repeated in French. By courtesy of the British Broadcasting Corporation, the announcements were recorded by two B.B.C. Overseas Service announcers, Mr. Roger Collinge, in English, and Mr. John R. Hadley, in French.

Announcements from the automatic announcer are broadcast by the loudspeakers on platforms 1 and 2; the group is selected by a key on the control unit. To initiate an automatic broadcast, the operator presses the appropriate push-button and holds it depressed until the corresponding pilot lamp on the unit lights up, showing that the play-back head is positioned over the desired recording and that the announcement is about to start. The button is then released; no further action by the operator is necessary. Certain short announcements relating to trains making short journeys are repeated twice in order to give maximum opportunity for passengers to hear them.

Checking and Monitoring

Facilities for the use of a hand microphone are provided on the foreman's control unit, and a volume level meter serves both as a guide to the local announcer and as a check that automatic broadcasts are being made at the correct level. The announcements can also be monitored on a loudspeaker in the office. A pilot ("engaged") light shows when an announcement is being made by hand microphone elsewhere on the two platforms.

The equipment racks in the relay room, besides the automatic equipment, accommodate three 30-W. amplifiers, one for the tape recorded announcements to platforms 1-2 and the others for the loudspeakers on platforms 3-4 and 5-6, over which announcements are made from hand microphone points on the respective platforms. All amplifiers incorporate automatic volume control units to prevent excessive volume levels with hand microphone announcements.

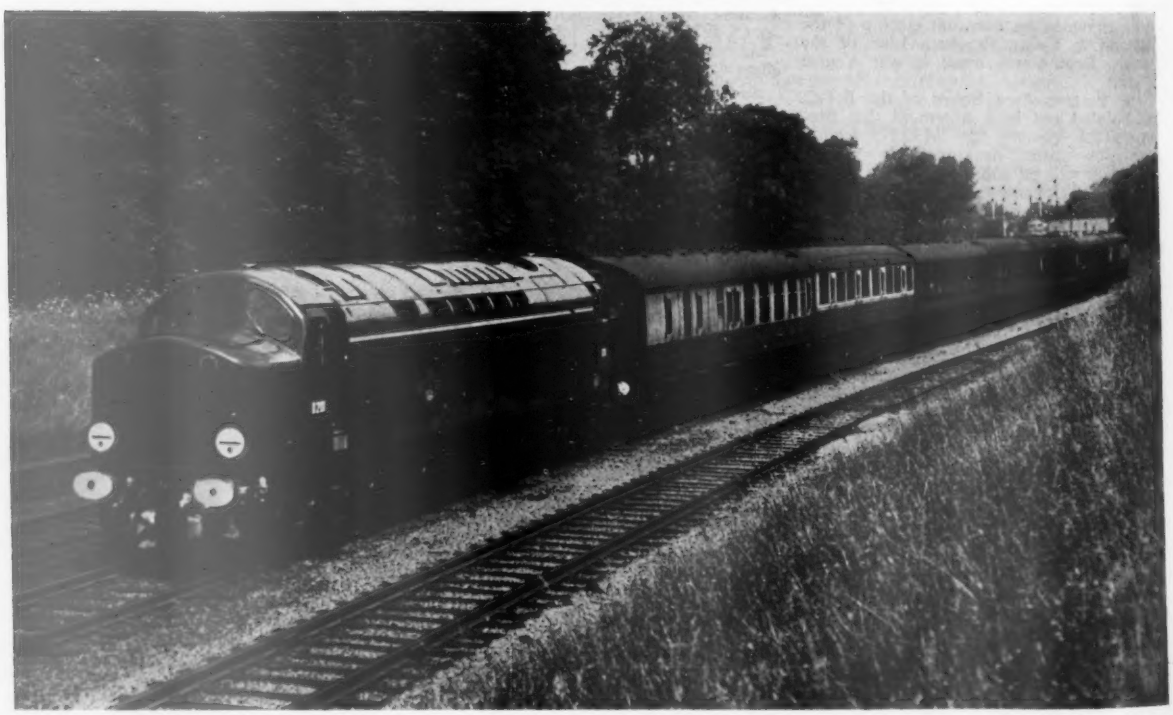
The equipment was supplied by the General Electric Co. Ltd. G.E.C. "hooded" loudspeakers are installed under the platform awnings, and Minor re-entrant horn loudspeakers are mounted on the lighting columns. The same firm also supplied a special miniature control unit for making emergency announcements from the signalbox.

A description of Gatwick Airport Station, with reference to the train working in connection with air passenger traffic, appeared in our April 18 issue.

ASSOCIATED BRITISH ENGINEERING LIMITED.—In the directors' review of Associated British Engineering Limited for the year ended March 31, it is stated that it will be a slow and gradual process to restore the fortunes of the automotive and industrial division.

A good start has been made in the free piston field and if this type of prime mover finds acceptance in markets at home and abroad, appreciable benefits should accrue to the group. Group profit for 1957-58 fell from £384,038 to £93,572.

Main Line Diesel Working in the Eastern Region



Up express on Great Northern main line between Hatfield and Brookman's Park hauled by English Electric Class "4" diesel-electric locomotive No. D201

Contracts and Tenders

Switchgear equipment for British Railways, Eastern Region

The British Transport Commission have placed an order with South Wales Switchgear Limited, of Blackwood, Monmouthshire, for 266 sets of 6·25-kV. switchgear equipment needed for the following electrification programmes in the Eastern Region of British Railways: Fenchurch Street to Tilbury and Southend; Liverpool Street to Enfield, Chingford, Hertford East, and Bishops Stortford; and Liverpool Street to Chelmsford and Southend. The switchgear will be installed at feeder stations to control a.c. supplies to the overhead line equipment, and at intermediate track-sectioning cabins along the lines to be electrified.

British Railways, Eastern Region, has placed the following contracts.

Metropolitan Vickers G.R.S. Limited, London, W.C.2: supply and installation of signalling and A.T.C. equipment between Gas Factory Junction and 20 mile post, in connection with the electrification of the London, Tilbury & Southend Line

Mechanised Contractors (London) Limited, London, W.5: remedial measures to cutting slopes and drainage, between Cuffley and Bayford

W. J. Cearns Limited, Stratford, London, E.15: provision of feeder station at Stratford and track sectioning cabin at Ilford

R. F. King Limited, Romford, Essex: provision of feeder stations at Chadwell Heath and Gidea Park.

British Railways, North Eastern Region, has placed the following contracts.

D. Mitchell & Co. Ltd., Keighley: one 10½-in. S.S. and S.C. lathe, Chaytors Bank, Gateshead

Sangwin Limited, Kingston upon Hull: earthworks for rail access, Poppleton, near York.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Formosa:

50 suburban passenger coaches, 27 *tonnes* tare weight, 3-ft. 6-in. gauge.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan (Formosa). The tender No. is 84-33-427-6-80230/1. This purchase will be financed by the International Co-operation Administration (I.C.A.), the agency through which the United States Government gives economic and technical assistance to other countries. The closing date is September 16, 1958. The Board of Trade reference is ESB/20644/58/I.C.A.

From Korea:

300 *tonnes* of rail, 40 lb./yd. in 30 ft. lengths, with splice bars and track bolts

300 *tonnes* of rail, 30 lb./yd. in 30 ft. lengths, with splice bars and track bolts

26,000 ft. of steel pipe, black, carbon welded, in standard lengths; in sizes: 6 in., 4 in., 2 in., and 1 in., with victaulic coupling for each length.

The issuing authority and address to which bids should be sent is the Dai Han Coal Corporation, Seoul, Korea. This purchase wil be financed by the International Co-operation Administration (I.C.A.), the agency through which the United States Government gives economic and technical assistance to other countries. The tender No. is 89-21-468-6-70289. The closing date is September 15, 1958. The Board of Trade reference is ESB/20619/58/I.C.A.

From Chile:

Locomotive, coach, and wagon spares including coupling rods, steam manometers, injectors and spares, lubricators, seamless steel tubes, serpentine tubes, spares for mechanical coal stokers, glass tubes for lubricators and boiler gauges, and spares for boiler feed pumps.

The issuing authority is the Chilean State Railways. Bids should be sent to El Senor Jefe del Departamento de Materiales y Almacenes, Ferrocarriles del Estado, Casilla 4742, Correo 2, Santiago de Chile. The closing date is October 10, 1958. The Board of Trade reference is ESB/20648/58.

From Sudan:

Signalling equipment, including ground frames, lower quadrant arm fittings, operating mechanisms, wire adjusting screws, wheels, pulleys, wires, and rodding for four Gezira Light Railway stations.

The issuing authority is the Sudan Gezira Board Supplies Department, Barakat. Tenders in sealed envelopes marked "Signalling Equipment for Four Stations" should be addressed to the Asst. General Manager (Supplies), The Sudan Gezira Board, Barakat. The Board of Trade reference is ESB/20358/58.

From Portuguese East Africa:

61 items of spares for locomotives including smokeboxes, boilers, tubular plates for furnaces, steam valve stands, superheater elements, bolts and nuts for fixing superheater elements, water circulating pipes, steam delivery pipes, smoke tubes, and safety valves.

The issuing authority is the Ports, Railways & Transport Department, Lourenço Marques. The tender No. is 154/58. A provisional deposit of Esc. 350,000 must be made by tenderers. The closing date is October 26, 1958. Tenders cannot be submitted direct, but only through firms established in Mozambique whose names are registered with the Stores Department of the Treasury, Lourenço Marques. The Export Services Branch will, on request, supply the names of local concerns who have expressed their willingness to act on behalf of U.K. firms. The Board of Trade reference is ESB/20970/58.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1.).

Following the revision of goods subject to embargo when exported to the Soviet Bloc and China, the Board of Trade has removed export control from a wide range of goods. They include rolling stock, soil compactors, and signalling apparatus. Because of the easier supply position the export of certain steel plate to all destinations is freed from control.

RECORD TOURIST TRAFFIC IN BRITAIN IN JUNE.—June was another record month for the British tourist industry. Figures released by the British Travel & Holidays Association show that 155,500 tourists arrived in this country during the month, 10 per cent more than in June, 1957. There was an increase of 24 per cent in the number of visitors from the U.S.A. The total number of visitors from Europe was roughly the same as the figure for June of last year.

Railbuses in Bedford Area

Park Royal railbus at Shefford on demonstration run before the introduction of railbus services in Bedford area of the London Midland Region (see our August 15 issue)

Notes and News

Widney Windows in Park Royal Railbuses.—The Park Royal railbuses for British Railways, described in our August 15 issue, are fitted with Widney main side windows; as stated in the article the manufacturer is Hallam, Sleigh & Cheston Limited.

First Diesel Built at Horwich Works.—The first diesel-electric shunting locomotive to be built at Horwich Works, London Midland Region, is now on trial at Newton Heath Motive Power Depot. The locomotive No. D3593 is of British Railways 350-h.p. 0-6-0 standard design and is the first of an initial order of 15 being built at Horwich for the Western Region. Slight modifications to the design have been necessary, mainly to the vacuum brake system, so that the engine can work vacuum fitted trains on the Western Region. The engine and electrical gear are by English Electric.

English Electric Locomotive Models for South Kensington Museum.—The accompanying illustration shows Mr. C. M. Cock, General Manager of the Traction Department of the English Electric Co. Ltd., presenting two models of locomotives built by English Electric, to Mr. T. C. S. Morrison-Scott, Director of the Science Museum, South Kensington, London. The larger model is of a 3,600-h.p. 3,000-V. d.c. electric locomotive for the R.E.N.F.E. Sixty of these were originally supplied and a repeat order for 15 is now being executed. The other model is of the first of its type to go into production, in 1934, of the 350-400 h.p. diesel-electric shunting locomotives which have become standard on British Railways. Since that date English Electric has supplied the railways with diesel-electric equipment for over 1,000 of these shunters, besides complete units. These locomotives also are used by railways in the British Commonwealth and elsewhere overseas.

Mr. T. C. S. Morrison-Scott, Director of the Science Museum, South Kensington, accepting models of English Electric locomotives from Mr. C. M. Cock.

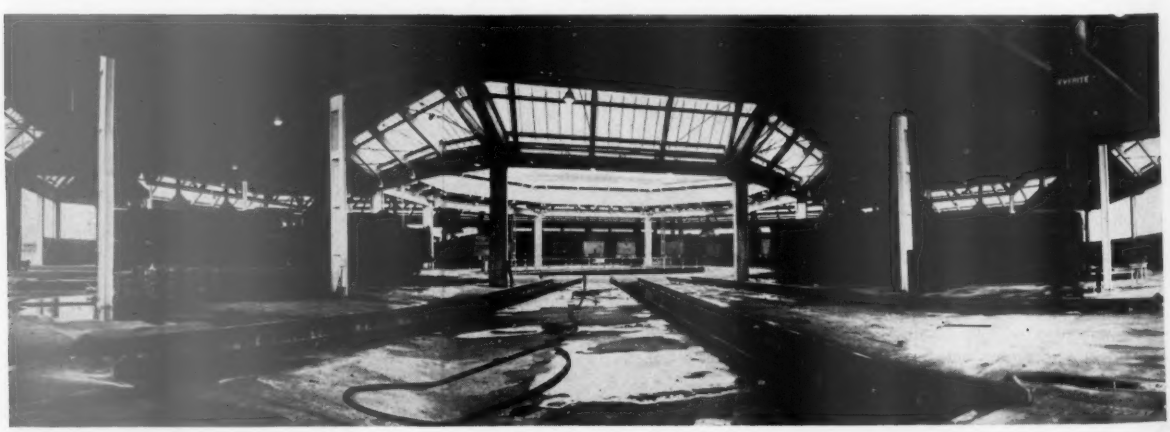
Cable Fire at Notting Hill Gate Station, L.T.E.—Notting Hill Gate Station, on the Central Line of London Transport, was closed for several hours on August 21, when fire broke out in the lighting room behind No. 2 platform. Workmen in the room are believed to have struck an electric cable with a pneumatic drill causing the fire and disconnecting the station lighting. Seven Central Line stations from Shepherds Bush to Bond Street were affected by the power failure. Lifts and escalators were out of action for 45 min. and emergency lighting was brought into action.

Rail Traffic Delayed by Storm.—Torrential rain on August 22, disrupted rail traffic in many districts. All trains out of Manchester Central Station, London Midland Region, to the Midlands and beyond were stopped because of flooding at Throstle Nest Junction, and main-line trains were operating in and out of Cheadle Heath Station. At Northenden, Lancashire, a bank was washed on to the line after a culvert burst; part of the track was destroyed and a train travelling from Stockport to Warrington was stranded. Train services to south-east London suburbs were dislocated when an embankment collapsed outside Blackheath Station, Southern Region, blocking lines in both directions for several hours. Services on the Tunbridge Wells—Brighton Line were also interrupted by a landslide which partly blocked the track near a tunnel entrance outside Crowborough Station. The track was also flooded, and emergency bus services operated between Crowborough and Buxted Stations.

London Midland Region Lecture & Debating Society.—With a membership of 600, British Railways, London Midland Region, Lecture & Debating Society had

Roundhouse Construction at Thornaby, North Eastern Region

(*See our August 8 issue*)



The octagonal shed, showing wrought-iron Warren girders recovered from Bradford Forster Square Passenger Station, and lightness due to extensive use of glass

a successful first season last year; it is expected that the 1958-59 session will see expansion. Mr. David Blee, General Manager of the Region, is President and other officers are vice-presidents by invitation. The Secretary is Mr. J. E. Whitehouse, Regional Welfare Officer, Euston. The Society was formed early in 1957 to promote good fellowship and to stimulate the interest of the staff in railway affairs generally and in allied forms of transport. Speakers in the 1958-59 programme include men prominent in industries outside the world of transport. There is to be an essay competition, with book prizes, on the subject "The place of the railways in our national transport system."

Electric Locomotives Struck by Lightning.—Two electric locomotives were struck by lightning at Guide Bridge Station, London Midland Region, British Railways, six miles from Manchester on August 21. One of the locomotives, hauling a Manchester to Sheffield train, had stopped at the station. The other was a relief. Only minor damage was caused and no one was hurt. The train continued 15 min. late after a new locomotive had been attached.

Road Casualties in June.—Road casualties in Great Britain during June numbered 26,961, a decrease of 429 compared with June, 1957; 457 persons were killed, and 5,922 seriously injured. The Road Research Laboratory estimates that traffic on main roads increased by 5 per cent compared with June of last year. In the first six months of the current year there were 12,979 more road casualties than in the same period of 1957, when petrol restrictions were in force until mid-May.

Rail Accident at Eastbourne Station, Southern Region.—Five people were killed and 25 injured when the Glasgow-Eastbourne car-sleeper express collided with the 6.50 a.m. electric train from Hastings to London Bridge at Eastbourne Station, Southern Region, British Railways, last Monday. The first two coaches of the 12-coach electric train were telescoped and a signal gantry was brought down; the front coach turned on its side across the tracks. Most of the casualties were in the front two coaches. The electric train was stationary at the platform at the time of the accident.

Diesel-Electric Haulage on East Coast Main Line.—This week, an English Electric 2,000-h.p., Type "4," diesel-electric locomotive has been used for passenger train haulage on the East Coast main line between Kings Cross and Newcastle. The purpose of these workings is to evaluate the performance of this locomotive type in view of the intended introduction of five locomotives of this type for regular service between the two towns when the winter timetable comes into operation on Monday, September 15. The trains which have been diesel-hauled this week are the down "Talisman," 4 p.m. from Kings Cross, and the up "Aberdonian," departing Newcastle at 2.52 a.m.

Rail and Flange Lubrication.—In the report by Signor Mario Viani on electric locomotive maintenance practice, summarised on pages 158 and 159 of our August 8 issue, mention was made of the use by the Belgian National Railways of automatic rail lubricators; but the S.N.C.B. was not included in the users of the British P. & M. type lubricators. In fact that administration is one of the biggest users of such lubricators in Europe. The Swiss Federal Railways and the Italian State Railways, two other of the systems covered by Signor Viani's report, also use this equipment, but not, so far, on the same scale as the Belgian National Railways.

Southern Region Refreshment Car Services.—In the editorial article in our August 15 issue on the Southern Region winter passenger services, it was stated, after perusal of an advance copy of the timetable, that Pullman refreshment car services would be continued in the 11 p.m. train from Victoria to Brighton. It is now announced that this facility is not to be provided, and the timetable is being amended accordingly.

Motor Rail Limited Reduced Dividend.—Because of more difficult conditions in the export markets and the reduction in activity at home it was not expected that the record of the year to March, 1957, would be equalled by the year to March, 1958. In fact deliveries were approximately 17 per cent less in total. The profit for the year to March, 1958, before taxation, is £43,320. A dividend of 7 per cent this year compares with the previous 8 per cent.

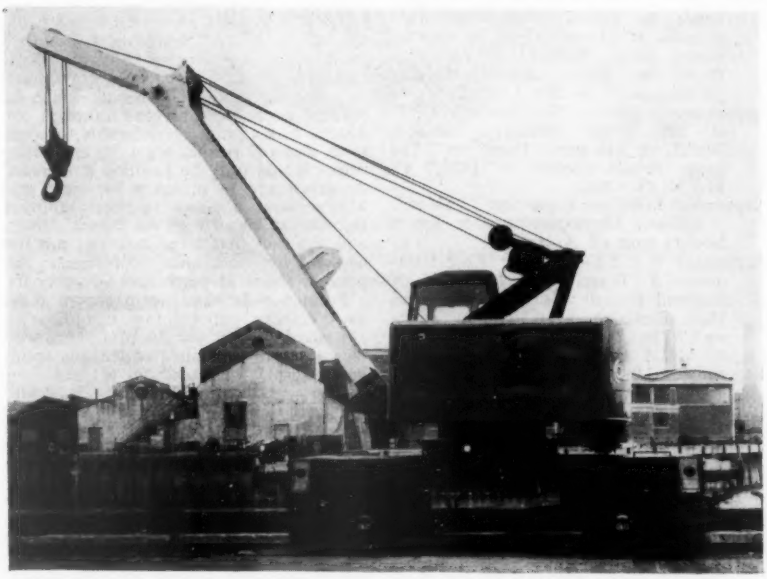
Dowty Group Report and Accounts.—In his report for the year ended March 31, the chairman of the Dowty Group, Sir George Dowty, refers to the research and experimental work which the company is undertaking on railway rolling stock equipment. He states that "developments in hand are now in an advanced state and are creating considerable interest." He believes that "substantial business will result." After providing £1,089,958 for taxation, the net profit of the Group is £928,472 compared with £792,322 for the previous year; the profits before taxation being 22 per cent greater than last year. A final dividend of 6½ per cent is recommended, resulting in a total distribution to 11½ (9) per cent net.

Rail-Mounted Cranes in the Eastern Region.—British Railways, Eastern Region, has purchased 13 Coles R.12105 diesel-electric rail-mounted cranes, not self-propelled. They have a maximum capacity of 10 tons, and are piped for vacuum, which makes possible travelling speeds of up to 45 m.p.h. in fitted trains. The 13 cranes will replace 42 older, manually-operated machines. They are powered by independent motions for hoisting, slewing and derricking, and are operated under the Coles diesel-electric system of control. The driver has all-round vision as he is seated on the slewing superstructure and can look into a high-sided wagon. Only a driver and a slinger are required to operate the cranes.

Wickham Limited Financial Results.—For the year ended March 31, Wickham Limited shows a consolidated profit of £365,119 (£465,448); the amount attributable to other shareholders in subsidiary companies is £57,097 (£50,560), leaving £308,002 (£414,928) attributable to the parent company. The sum brought forward is £308,202 (£234,991); the amount capitalised is £13,583 (nil). The dividend on the £3,100,000 ordinary shares is 8 per cent (13 per cent on £1,600,000).

New Offices for Traffic Manager, Doncaster.—The Traffic Manager, Doncaster, on the Great Northern Line of British Railways, Eastern Region, began to function in January as a part of the decentralised organisation. His staff at present is dispersed in separate buildings. Work began recently on a new office block. The new offices will consist of a five-storey building facing Doncaster Station forecourt. The four upper floors are to be constructed of pre-fabricated pre-stressed concrete components with a view to rapid erection. The building has been designed by the Regional Architect, Mr. H. H. Powell, under the general direction of Mr. A. K. Terris, Chief Civil Engineer of the Region. The main contractor is Frank Haslam Limited.

Stockport Road Bridge Completed.—Lord Rusholme, Chairman of the London Midland Region Area Board, of the British Transport Commission, and Mr. J. Taylor Thompson, Chief Civil Engineer of the London Midland Region, watched the last unit of the new four-track bridge



One of 13 *Coles R.*12105 *rail-mounted cranes ordered for use in the Eastern Region*

over Stockport Road, Manchester, being rolled into position on August 24. The 122-ft. span bridge has been made from 35-ton hollow concrete blocks held together by tensed steel cables and is one of the biggest in the country constructed in this way. It has been erected alongside the existing bridges which it is replacing. A new bridge was necessitated by the weight of the electric locomotives and rolling stock working on the Crewe to Manchester line.

Southern Region Station Names Change.—On September 15 Boxhill & Burford Bridge Station on the Southern Region line from Leatherhead to Dorking North, will be renamed Boxhill & West Humble, and Woodbury Road, on the Exeter-Exmouth branch, will be known as Exton.

Reduced Services for Southern Region Stations.—From September 15, on introduction of the winter passenger timetable, the services to and from certain Southern Region stations will be reduced. Stations to be closed on Sundays for the winter are Sholing, between Fareham and Southampton; Chandlers Ford, between Eastleigh and Romsey; Horsebridge and Fullerton, between Romsey and Andover; Itchen Abbas, between Alton and Winchester; and Hamworthy Junction, between Poole and Wareham. Sunday, early morning, mid-day, and late night trains will not stop at: Swanwick, Bursledon, Hamble Halt, and Bitterne, between Fareham and Southampton; Botley, between Eastleigh and Fareham; and Ropley, between Alton and Winchester. Late night services on weekdays are to be withdrawn from Hamble Halt, Sholing, Chandlers Ford, and Fullerton.

Forthcoming Meetings

September 2 (*Tue.*).—Permanent Way Institution, Leeds & Bradford Section, in the British Railways Social & Recreation Club, Ellis Court, Leeds City Station, at 7 p.m. Paper on "American railroads," by Mr. J. Nichols, British Railways, Eastern Region.

September 2 (*Tue.*).—Railway Correspondence & Travel Society, Sheffield Branch, at Livesey-Clegg House, 44, Union Street, Sheffield, at 7.30 p.m. Paper on "Fifty years of Midland performance," by Mr. J. F. Clay.

September 5 (*Fri.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7.30 p.m. Paper on "The great Bristol contest of 1835," by Mr. K. G. Carr.

September 5 (*Fri.*) to September 15 (*Mon.*).—Railway Correspondence & Travel Society tour of Austria.

September 6 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch at the M.P.D. Social Hall, Eastleigh, at 6.30 p.m. Paper on "The North London Railway," by Mr. A. P. Hancox.

September 11 (*Thu.*).—Railway Correspondence & Travel Society, Bristol & District Branch, at the Grosvenor Hotel, Bristol, 1, at 7.15 p.m. Paper on "The pre-grouping railways of South Wales," by Mr. D. S. M. Barrie.

September 12 (*Fri.*).—Electric Railway Society, at the Exchange & Engineering Centre, New Street, Birmingham, at 7 p.m. Paper on "Rapid transit and suburban railways," by Mr. B. J. Prigmore.

September 16 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Paper on "The Leek & Manifold Railway," illustrated by lantern slides, by Dr. J. R. Hollick.

September 17 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Mr. Robert Arbuthnott's Presidential Address.

September 18 (*Thu.*).—Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. Film show, including "The mechanical maintenance of points and crossings," and "Fitted freight."

September 19 (*Fri.*).—Railway Correspondence & Travel Society, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Illustrated lecture on "The Talyllyn Railway," by the Earl of Northesk.

September 20 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch, at the C.B.B. Employees' Club, Palmerston Road, Boscombe, at 5.30 p.m., by Mr. E. A. Course.

September 20 (*Sat.*).—Permanent Way Institution, East Anglia Section. Visit to Potters Bar new tunnel.

September 20 (*Sat.*).—Permanent Way Institution, London Section. Visit to London Airport engineering base to inspect hangars, workshops and aircraft under maintenance.

September 21 (*Sun.*).—South Yorkshire Rail Tour No. 4.

Railway Stock Market

The rise in stock markets has been accelerated and new high levels for the year have been reached by many industrial shares. Sentiment continued to benefit from the assumption that the reduction in the bank rate to 4½ per cent is an indication of confidence in the outlook for the £, and that a satisfactory trend is expected to be maintained in our export trade. On the other hand, earnings in many industries are still below those of a year ago because of competition both at home and abroad, which has reduced profit margins, and although conditions may change considerably, it would seem that any further big advance in share prices would only be justified if increased dividends are in prospect for next year. Many shares are now in short supply in the market because of the bigger demand and the fact that large holdings are now owned by insurance companies and pension funds as permanent investments.

Foreign rails have again shown rather more activity, but Antofagasta ordinary at 14¼ eased slightly and the preference stock receded to 29⅛. United of Havana second income stock was steady at 6½, San Paulo Railway 3s. units kept at 3s., while Mexican Central "A" bearer debentures remained at 70½. Brazil Railway bonds were 5¼, and in other directions, Chilean Northern 5¼ per cent first debentures changed hands around 47½ and Costa Rica ordinary stock was 16.

Activity has continued in the capital stock of West of India Portuguese Railway at around 79, while the 5 per cent debentures were quoted at 67½. Barsi Railway stock has been maintained at 23. Nyasaland Railways shares were 10s. 3d., with the 3½ per cent debentures 68¼.

Canadian Pacifics remained active, but were dominated more by the less buoyant trend on Wall Street than by the strength of London markets, and at $51⅛ were little changed on balance. The 4 per cent preference stock has been firm at 54½, with the 4 per cent debentures 66¾. White Pass shares changed hands around $14.

Recent gains in some shares of locomotive builders and engineers were barely held, because it is realised that it must be some while before profits reflect the British Transport contracts and that competition to secure foreign orders is as keen as ever. North British Locomotive remained active, but eased slightly to 13s. Beyer Peacock 5s. shares changed hands around 8s. 6d., while profit taking following the recent rise put Charles Roberts 5s. shares back to 10s. 4½d. G. D. Peters shares were as firmly held as ever and were quoted at 21s. 10½d. Birmingham Wagon shares were 15s. 3d.

Westinghouse Brake have been firm at 38s. 3d. and recent gains were well held by Associated Electrical at 53s. 3d., which is almost the highest level so far this year: sentiment was helped by the half-yearly profit figures. English Electric at 56s. 3d. were virtually at their best of the year, and General Electric at 36s. held almost all their recent rally. Crompton Parkinson 5s. shares at 12s. were at the best of the year. Davy United rose 5s. 6d. to 72s. 6d. and talk of the possibility of a rights issue on attractive terms. Thompson Bros. (Bilston) shares rose to 10s. 4½d. following the takeover offer made by John Thompson whose shares have been firm at 25s. 3d. Edgar Allen were firm at 33s. 3d., while Newton Bros. (Derby) 2s. shares changed hands up to 5s.

Steel shares have rallied on indications that an immediate general election would probably result in a Conservative majority. The view appears to be growing that even if there were a Labour win at the next election it is by no means certain that the steel companies would be re-nationalised. Compared with a week ago, gains in steel shares have ranged up to 3s., with Stewarts & Lloyds at 26s. 1½d. United Steel and Dorman Long were 23s. 4½d.

Dowty Group 10s. shares have risen to 37s. 9d., their highest for the year, following publication of the annual report which emphasises the progressive policy of the company and the broad basis of its activities. Pressed Steel 5s. shares held their rise to 17s. 10½d., British Timken were good at 49s. 3d. and Vokes 4s. shares firm at 15s. 9d.

OFFICIAL NOTICES

CIVIL STRUCTURAL ENGINEER. (Salary range: £900-£1,400); and DESIGN ASSISTANT (Salary scale: £600 by £25 to £900) required for Civil Engineers Department, Nottingham. The department handles a wide range of Civil Engineering work mainly in connection with design and execution of large colliery projects and reconstruction schemes. Experience in the design and layout of large sidings and marshalling yards is most desirable, with some knowledge of industrial design in steel or concrete. Applicants for the senior post should be Corporate Members of the Institution of Civil or Structural Engineers. Applications giving age, full details of education, qualifications and experience to: Divisional Chief Staff Officer, National Coal Board, East Midlands Division, Sherwood Lodge, nr. Arnold, Nottingham.

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